

Digitized by the Internet Archive
in 2012 with funding from
LYRASIS Members and Sloan Foundation

<http://archive.org/details/publicdoc22conn>

FIFTEENTH REPORT

OF THE

FISH COMMISSIONERS

OF THE

State of Connecticut,

TO THE

GENERAL ASSEMBLY,

JANUARY SESSION, 1881.



MIDDLETOWN, CONN.

PELTON & KING, PRINTERS AND BOOK-BINDERS.

1881.

STATE OF CONNECTICUT.

REPORT.

To His Excellency the Governor, and the General Assembly of Connecticut:

The Commissioners on Fisheries respectfully present their Fifteenth Report.

The past year shows no abatement of interest in the culture and increase of food-fishes in the United States. The example set by Massachusetts and Connecticut but a few years ago has been rapidly followed by most of the other States and some of the Territories. The manifest success of these two pioneer States has been a great stimulus to this wide extension of fish-culture. But the encouragement and invaluable aid afforded by the United States Fish Commissioner, Prof. Baird, have contributed beyond all other influences to produce these results. The thirty-two States and Territories that have appointed Commissioners and made appropriations for the protection and increase of food-fishes, have an aggregate area of land exceeding a million and a half (1,568,889) square miles. Throughout this vast extent of territory are scattered immense bodies of water, rivers, creeks, brooks, lakes and ponds, which will in time be brought under judicious protection and management—and it cannot be many years before good edible fish will be produced in such abundance as to be within the means of the poorest. The more recently settled States have a great advantage in the fact that few, if any, of their

waters have been depleted, as in the older States ; and their task will be to regulate and protect rather than to cultivate and restore.

The territorial extent of Connecticut, only 4,674 square miles, is insignificant in comparison with that of most of her sister States, only three being smaller than herself. Her waters, therefore, are not so numerous nor so extensive for varied cultivation ; but the Commissioners believe that in the progress made towards a complete development of her limited resources she is second to no other State. This work began with the introduction of full-grown black bass into the principal ponds of each County in the State, and it proved an encouraging success. About the same time an attempt was made to restock the depleted rivers of the State with such fish as had been known to thrive there in earlier times. It was believed that the shad and salmon, for example, could be restored to the Connecticut, the Housatonic and the Thames rivers, where they once abounded. The experiments with shad resulted in a rapid and positive success. With salmon, however, the processes were much slower and more laborious ; but the result was all that had been anticipated by the most sanguine. The experience gained in these triumphs encouraged the Commissioners in the further work of procuring new species—fish suited to the larger ponds. So land-locked salmon, a superb fish, was introduced, and it is doing well. Finally the past year, trout have been artificially raised and distributed ; and carp, supplied by Prof. Baird, have been introduced. The trout occupy the smaller brooks scattered among the hills and valleys ; while the carp finds his home in the swampy and muddy ponds of the lowlands. The Commissioners are confident that within a very few years these two species will abound in every town in the State.

As far as practicable all sections of the State have been favored alike in the distribution of the fry of the fish above named ; and all seem to be reaping beneficial results from them. So that Connecticut is obviously in a fair way of utilizing all her waters to an extent not anticipated at the beginning of the Commissioners' work. In a very few years the people of the State will doubtless have a variety of fish-food abundant and cheap. But to make this desirable end cer-

tain and sure, it requires a continuance of the fostering care of the State as heretofore, and a due respect on the part of the fishermen for the laws governing the taking of fish.

Few people are aware of the great nutritive value of the flesh of fish. The fact that it has been a favorite food of all nations, in all ages, and with many the principal food, would be sufficient evidence of its nutritive and health-promoting properties. But within the last few years considerable attention has been given to the subject by scientists, and their chemical analyses of the flesh of fish clearly demonstrate it to be nearly if not quite as nutritious as beef!

Prof. W. O. Atwater, of Wesleyan University, working under the auspices of the Smithsonian Institution and U. S. Fish Commission, has made fish-food a subject of special scientific investigation—and although he claims that his labors, so far, are but a beginning, the Commissioners deem them of sufficient interest and importance to entitle them to an extended review in this Report. Want of space, however, restricts the Commissioners to the briefest statement of his most valuable results. The following facts are condensed from papers kindly furnished by Prof. Atwater :

The albumenoids, such as wheat-gluten, white of eggs, lean meat, curd, etc., are the nitrogenous constituents of foods, which make the lean flesh of the human body, the muscle, the connective tissues, skin, etc., and are the most important of the nutrients. Next in importance are the fats, such as oil, lard, butter, etc.; and last in importance are the carbo-hydrates, such as sugar, starch, and the like. With the albumenoids alone we might maintain life a good while; but with the fats and carbo-hydrates alone, starvation would soon follow. Now, the flesh of fish, like other animal foods, consists mainly of albumenoids, with more or less fats and very little of the carbo-hydrates. With this preliminary statement the following table of the analyses of some of our most common food-fishes will be easily understood :

waters have been depleted, as in the older States ; and their task will be to regulate and protect rather than to cultivate and restore.

The territorial extent of Connecticut, only 4,674 square miles, is insignificant in comparison with that of most of her sister States, only three being smaller than herself. Her waters, therefore, are not so numerous nor so extensive for varied cultivation ; but the Commissioners believe that in the progress made towards a complete development of her limited resources she is second to no other State. This work began with the introduction of full-grown black bass into the principal ponds of each County in the State, and it proved an encouraging success. About the same time an attempt was made to restock the depleted rivers of the State with such fish as had been known to thrive there in earlier times. It was believed that the shad and salmon, for example, could be restored to the Connecticut, the Housatonic and the Thames rivers, where they once abounded. The experiments with shad resulted in a rapid and positive success. With salmon, however, the processes were much slower and more laborious ; but the result was all that had been anticipated by the most sanguine. The experience gained in these triumphs encouraged the Commissioners in the further work of procuring new species—fish suited to the larger ponds. So land-locked salmon, a superb fish, was introduced, and it is doing well. Finally the past year, trout have been artificially raised and distributed ; and carp, supplied by Prof. Baird, have been introduced. The trout occupy the smaller brooks scattered among the hills and valleys ; while the carp finds his home in the swampy and muddy ponds of the lowlands. The Commissioners are confident that within a very few years these two species will abound in every town in the State.

As far as practicable all sections of the State have been favored alike in the distribution of the fry of the fish above named ; and all seem to be reaping beneficial results from them. So that Connecticut is obviously in a fair way of utilizing all her waters to an extent not anticipated at the beginning of the Commissioners' work. In a very few years the people of the State will doubtless have a variety of fish-food abundant and cheap. But to make this desirable end cer-

tain and sure, it requires a continuance of the fostering care of the State as heretofore, and a due respect on the part of the fishermen for the laws governing the taking of fish.

Few people are aware of the great nutritive value of the flesh of fish. The fact that it has been a favorite food of all nations, in all ages, and with many the principal food, would be sufficient evidence of its nutritive and health-promoting properties. But within the last few years considerable attention has been given to the subject by scientists, and their chemical analyses of the flesh of fish clearly demonstrate it to be nearly if not quite as nutritious as beef!

Prof. W. O. Atwater, of Wesleyan University, working under the auspices of the Smithsonian Institution and U. S. Fish Commission, has made fish-food a subject of special scientific investigation—and although he claims that his labors, so far, are but a beginning, the Commissioners deem them of sufficient interest and importance to entitle them to an extended review in this Report. Want of space, however, restricts the Commissioners to the briefest statement of his most valuable results. The following facts are condensed from papers kindly furnished by Prof. Atwater :

The albumenoids, such as wheat-gluten, white of eggs, lean meat, curd, etc., are the nitrogenous constituents of foods, which make the lean flesh of the human body, the muscle, the connective tissues, skin, etc., and are the most important of the nutrients. Next in importance are the fats, such as oil, lard, butter, etc.; and last in importance are the carbo-hydrates, such as sugar, starch, and the like. With the albumenoids alone we might maintain life a good while; but with the fats and carbo-hydrates alone, starvation would soon follow. Now, the flesh of fish, like other animal foods, consists mainly of albumenoids, with more or less fats and very little of the carbo-hydrates. With this preliminary statement the following table of the analyses of some of our most common food-fishes will be easily understood :

TABLE I.

Analysis of Fish, Ingredients of Flesh and of Whole or Dressed Fish, as taken for Analysis.

KIND OF FISH AND PART TAKEN FOR ANALYSIS.	FLESH—EDIBLE PORTION.				WHOLE OR DRESSED FISH.						
	Water.	Solids.	Ingredients of solids (Nutrients).			Waste, bones, skin, entrails, etc.	Edible Portion.				
			Albuminoids (Protein).	Fats.	Mineral Matter.		Water.	Albuminoids.	Fats.	Mineral Matters.	T ^l edible solids.
1. Flounders,—Entrails removed,	82.85	17.15	15.24	0.62	1.29	58.51	4.37	6.33	0.26	0.53	7.12
2. Halibut,—Posterior portion of body,	79.36	20.64	17.33	2.15	1.10	24.13	30.22	13.14	1.63	0.88	15.65
3. Halibut,—Section of body,	69.26	30.74	19.08	10.61	1.15	11.59	61.23	16.86	9.29	1.03	27.18
4. Cod,—Head and entrails removed,	83.12	16.18	15.44	0.28	1.26	35.40	53.63	9.97	0.18	0.82	10.97
5. Cod,—Head and entrails removed,	82.45	17.55	15.90	0.40	1.24	31.63	56.38	10.86	0.27	0.86	11.99
6. Eels,—Skin, head and entrails removed,	70.44	29.56	18.66	9.80	1.00	23.99	53.60	14.33	7.43	0.68	22.41
7. Alewives,—Whole,	75.70	21.30	18.90	3.94	1.46	50.45	37.51	9.37	1.95	0.72	12.04
8. Shad,—Whole (Hudson River, first of season),	69.34	30.66	18.59	10.77	1.30	51.58	33.58	8.99	5.22	0.63	14.84
9. Shad,—Whole (Connecticut River, first of season),	64.53	35.47	19.80	14.25	1.42	47.37	33.95	10.42	7.48	0.78	18.68
10. Striped Bass,—Whole (Connecticut River),	78.66	21.34	18.86	1.56	0.92	57.75	33.23	7.97	0.66	0.39	9.62
11. Striped Bass,—Entrails, head, skin, etc., removed,	79.61	20.39	16.32	2.70	1.37	57.49	33.84	6.94	1.15	0.58	8.67
12. Mackerel,—Whole,	77.82	22.18	19.05	2.18	0.95	39.18	47.32	11.61	1.32	0.57	13.50
13. Mackerel,—Whole,	74.23	25.77	17.51	7.02	1.24	54.23	33.98	8.01	3.21	0.57	11.79
14. Bluefish,—Entrails removed,	78.15	21.85	19.33	1.25	1.27	49.66	39.34	9.37	0.63	0.64	11.00
15. Salmon,—Entrails removed, (Maine,)	66.41	33.59	19.72	12.71	1.10	23.61	50.75	15.06	9.75	0.83	25.64
16. Porgie,—Whole,	79.69	20.31	17.45	1.46	1.40	61.66	30.55	6.69	0.56	0.54	7.79
17. Haddock,—Entrails removed,	80.63	19.37	18.03	0.18	1.16	52.73	37.32	8.34	0.08	0.53	8.95
18. Lake Trout,—Entrails, head, skin, etc., removed,	68.69	31.31	17.70	12.26	1.35	56.69	29.75	7.67	5.30	0.59	13.56
19. Brook Trout,—Entrails, head, skin, etc., removed,	75.70	24.30	19.92	3.02	1.36	53.05	35.54	9.35	1.42	0.64	11.41
20. Whitefish,—Entrails, head skin, etc., removed,	69.59	30.41	21.66	7.14	1.61	54.23	31.85	9.92	3.26	0.74	13.92
21. Red Snapper,—Entrails, head, skin, etc., removed,	75.45	24.55	22.40	0.67	1.48	60.40	29.88	8.87	0.26	0.59	9.72

The fish analyzed were gathered from the fishmarkets of Middletown and New York—some were dressed, others not dressed. Each sample was weighed at the laboratory, then the edible portion of the flesh was separated from the skin, bones, entrails, etc., weighed and prepared for analysis. The figures in the table show, first, the composition of the edible portion of the flesh; and, second, the calculated composition of the whole fish, either entire or dressed. The column headed "water" shows the large percentage of water in the different samples. For example, in a hundred pounds of the flesh of cod we have 83 per cent. of water, and only 17 per cent. of solids; while in the flesh of salmon we have 66½ per cent. of water, and 33½ per cent. of solids—that is to say, about 1-6 of the flesh of cod and 1-3 of the flesh of salmon consist of solids which are actual nutritive substances, the rest being water. The reader can readily compare any other fish in the table and so get their relative value for food. A good quality of beef—lean meat, free from bone—contains about 75 per cent. water and 25 per cent. solids, while the fat beef may have as low as 55 per cent. of water. Fish on the whole are rather more watery than beef. Still, the difference is not very great.

If we consider now, not simply the edible portion, but the whole sample as sold in the markets, either in the entire fish or that which is left after it is dressed, we have different figures; just as the percentage of edible solids in roast beef would be less than in the meat without the bone. The figures are based upon the raw flesh separated in the laboratory from the bones. It is not so easy to get the flesh off clean from the bones in this way as it is after the fish has been cooked. Bony fish are more difficult to strip clean than others. Hence they lose a little, and so appear in the table at a slight disadvantage. If the economical housewife will cast her eye down the last column of this table she will more easily judge which fish is really cheapest in view of its nutritive qualities. Then she will see that she can afford to pay as much, indeed, a little more, per pound for the best cut of halibut than for salmon, and three times as much per pound as for striped bass; while there is twice as much nutriment in Connecticut River shad as in haddock!

The following table, however, is interesting and instructive, as showing not only the composition of foods but also their nutritive value as compared with medium beef, which is placed at 100. This table, for meat, fowl, eggs and cured fish, was prepared by Dr. König, of Germany, who has given more especial attention to this subject than anybody else. That portion which comes under the head of "fish" is the work of Prof. Atwater.

This table will help to a very fair idea of the comparative composition and value of our more common animal foods. The percentages refer to the fresh substance, except when otherwise specified. In the meats and fish the bones are excluded, the calculation referring only to the edible portions.

TABLE II.

COMPOSITION AND VALUATION OF ANIMAL FOODS. (Flesh free from Bone.)	INGREDIENTS.					Nutritive Valuation com- pared with med'm beef—100.
	Water.	Albuminoids, Protein.	Fats.	Extractive Matters.	Mineral Ingredients.	
MEAT.						
Beef, lean, - - - - -	76.71	20.61	1.50	—	1.18	91.3
Beef, medium, - - - - -	72.25	21.39	5.19	—	1.17	100.0
Beef, fat, - - - - -	54.76	16.93	27.23	—	1.08	112.0
Veal, fat, - - - - -	72.31	18.88	7.41	07	1.33	92.4
Mutton, medium, - - - - -	75.99	18.11	5.77	—	1.33	86.6
Pork, fat, - - - - -	47.40	14.54	37.34	—	0.72	116.0
Smoked beef, - - - - -	47.68	27.10	15.35	—	10.59	146.0
Smoked ham, - - - - -	27.98	23.97	36.48	1.50	10.07	157.0
GAME, FOWL, ETC.						
Venison, - - - - -	75.76	19.77	1.92	1.42	1.13	88.8
Hen, - - - - -	70.06	18.49	9.34	1.20	0.91	93.9
Duck, - - - - -	70.82	22.65	3.11	2.33	1.09	104.0
MILK, EGGS, ETC.						
Cows' milk, - - - - -	87.41	3.41	3.66	4.82	0.70	23.8
Cows' milk, skimmed, - - - - -	90.63	3.06	0.79	4.77	0.75	18.5
Cows' milk, cream, - - - - -	66.41	3.70	25.72	3.54	0.63	56.1
Butter, - - - - -	14.14	0.86	83.11	0.70	1.19	124.0
Cheese, skimmed milk, - - - - -	48.02	32.65	8.41	6.80	4.12	159.0
Cheese, fat, - - - - -	46.82	27.62	20.54	1.97	3.05	151.0
Cheese, very fat, - - - - -	35.75	27.16	30.43	2.53	4.13	163.0
Hens' eggs, - - - - -	73.67	12.55	12.11	0.55	1.12	72.2
FISH.						
Flounder, - - - - -	82.85	15.24	0.62	—	1.29	65.0
Halibut, - - - - -	74.31	18.20	6.38	—	1.12	88.0
Cod, - - - - -	82.78	15.67	0.34	—	1.25	68.0
Eels, - - - - -	70.44	18.66	9.80	—	1.00	95.0
Shad, - - - - -	66.93	19.19	12.51	—	1.36	99.0
Striped Bass, - - - - -	79.13	17.59	2.13	—	1.14	79.0
Mackerel, - - - - -	76.02	18.28	4.60	—	1.09	86.0
Bluefish, - - - - -	78.15	19.33	1.25	—	1.27	85.0
Salmon, - - - - -	66.41	19.72	12.71	—	1.10	104.0
Haddock, - - - - -	80.63	18.03	0.18	—	1.16	78.0
Lake Trout, - - - - -	68.69	17.70	12.26	—	1.35	94.0
Brook Trout, - - - - -	75.70	19.92	3.02	—	1.36	91.0
Whitefish, - - - - -	69.59	21.66	7.14	—	1.61	103.0
Red Snapper, - - - - -	75.45	22.40	0.67	—	1.48	97.0
CURED FISH.						
Salt Mackerel, - - - - -	48.43	20.82	14.40	0.38	16.27	111.0
Dried Cod, - - - - -	16.16	78.91	0.78	2.59	1.56	346.0
Smoked Herring, - - - - -	69.49	21.12	8.51	—	1.24	104.0

On the whole, it will be seen that the fish average about the same percentages of albumenoids as the meats, but have rather less fats :

Taking the samples of fish at their retail prices in Middletown markets, the edible solids, the actually nutritive materials, of striped bass cost about \$2.30 a pound, while the edible solids of Connecticut River shad cost about 44 cents the pound.

The nutritive solids in one sample of halibut cost 57 cents a pound, and in another, \$1.45; both bought at the same place at 15 cents per gross pound; showing a difference in different cuts of the same fish. A little definite knowledge which this table affords will enable the economist to furnish his table at great saving of expense. Of course, these nutritive valuations are only approximate, since they are based on very few analyses, and with little knowledge of digestibility and the influence of palatability; but the best chemists and physiologists have investigated so far, that they feel warranted in asserting the nutritive values of foods, and thus arranging them in tables for popular use. The facts attained, however, do not exhaust the subject; they are only feeble and imperfect beginnings.

Prof. Atwater claims that the wide-spread notion is unfounded, that fish is particularly valuable for brain food, because of its large contents of phosphorus. There is no evidence that fish has any more than other meats; and if it were so, there is no proof that it thereby becomes more valuable as a brain food.

PENOBSCOT SALMON. (*Salmo Salar*.)

The number of salmon introduced into State waters, the past year, was much smaller than in previous years. This was owing to an accident at Dead Brook, in the town of Bucksport, Me., where the adult fish had been impounded in the early summer of 1879, by Mr. Atkins. His account of this accident, taken from his report to the Commissioners, is as follows:—

“About 250 breeding salmon were purchased in June, and placed in the enclosure. About 30 of these died from one cause and another, and in August came a destructive freshet, which burst our enclosure and let loose the majority of those remaining. The men in charge were carefully guarding the upper barrier, which, of course, bore the brunt of the onset, and intercepted all floating rubbish. Meanwhile, fine weeds, and grass, and lily leaves, growing within the enclosure, were torn from their roots, and borne down against the lower barrier, which was soon matted up like a piece of cloth. Not being built with a view to withstanding a complete choking up like this, the racks gave way, and before the mischief was discovered the majority of the fish had departed. There will be no difficulty in guarding against the

recurrence of such a disaster, for had the manner of it been foreseen, the racks might easily have been kept from clogging up.

"When the spawning season arrived, only 58 of the fish could be captured, and of these 39 proved to be males, and only 19 females. The harvest of eggs was therefore very small, only 178,000 instead of the million that we counted on.

"However, the eggs obtained are of uncommonly good quality, and were exceedingly well impregnated. Your share of 60,000 has already been forwarded to your agent, Mr. Henry J. Fenton, at Windsor, and I trust will turn out well. Another season, doubtless, greater results will be obtained.

Very truly yours,

"CHAS. G. ATKINS."

Of the 60,000 eggs received, 226 were dead when unpacked; 880 died in the hatching troughs; and 610 fish died before the absorption of the yolk-sac. The 58,000 fish left, were placed in the following named tributaries of the Farmington River, which is a branch of the Connecticut :—

West Brook,	-	-	-	-	-	-	-	10,000
Birch Brook,	-	-	-	-	-	-	-	6,000
Thrall's South Brook,	-	-	-	-	-	-	-	10,000
Thrall's North Brook,	-	-	-	-	-	-	-	10,000
White Brook,	-	-	-	-	-	-	-	10,000
Trout Brook,	-	-	-	-	-	-	-	12,000

It was deemed best, not to divide so small a number with the other rivers of the State, but to concentrate them where they would be likely to produce the most decisive results.

Ten years ago, one great ambition of the Fish Commissioners was to determine practically whether salmon could be restored to the Connecticut, and to this end much time and money were spent. Many obstacles were met and overcome, from time to time, through a period of five or six years. At last, in the winter of 1878, the Commissioners had good reason to believe, and they so announced to the Legislature, that there would be a run of salmon in the following spring; and they asked for a law to protect them against rapacious fishermen. The idea of a return of salmon was laughed at and ridiculed as chimerical, and the Commissioners were looked upon as enthusiasts and dreamers. As for legislating to protect fish, that existed only in the brains of the Commissioners, it was too

absurd ! So, no law was passed. But it was only a few days after the Legislature had adjourned, when the predicted fish began to arrive ; and in three months, more than five hundred full grown salmon were taken in the river by the fishermen ! Nearly the whole run must have been destroyed, as not more than half a dozen were known to have reached the Holyoke dam.

In March, 1879, however, the following law was enacted :

AN ACT FOR THE PROTECTION OF SALMON.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

Every person who shall take from any of the waters of this State any salmon or grilse, or any of the young fry thereof, prior to the first day of May, 1883, shall be fined not less than fifty nor more than five hundred dollars, or imprisoned not less than two nor more than six months, or both ; unless he take such fish unintentionally and immediately restore it to the waters from which it was taken.

Approved, March 26, 1879.

It is a suggestive fact that all the salmon since seen by the fishermen were found dead in the net ! Of course, when a salmon was thus caught it would be useless to "immediately restore it to the waters from which it was taken." In truth, the capture of salmon goes on as if there were no laws ; nearly all the "dead" fish being sent to New York, where they bring from a dollar to a dollar and fifty cents a pound—more than any other salmon in the market. Only a few have been reported as caught by the fishermen the past season. It is a gratifying fact, however, to know that these few weighed from 16 to 30 pounds apiece, and were in excellent condition.

The resolution making the usual appropriation for the use of the Fish Commissioners called for \$3,000, of which \$500 was for this branch of the work. The Committee on Fisheries, however, struck out the \$500, alleging that it would be useless to propagate salmon if the fishermen were to take all the mature fish on their first return from the sea. In deference, therefore, to the expressed opinion of the Committee, the Commissioners have spent no money in the propagation of the Penobscot salmon the past year. They have done

this with great reluctance : for the decided success which crowned this part of their work could be made permanent and lasting only by continuing the planting of the salmon-fry, procured on the Penobscot ; *and, above all, by passing suitable laws and rigidly enforcing them.* It seemed unwise to let the work drop at the moment when all doubts had been dispelled ; for it had been already demonstrated : 1st, That salmon can be propagated at slight expense ; 2nd, That they find ample feeding grounds beyond the mouth of the river ; and, 3d, That after leaving the river they return in due time—in size and quality, superior to all others. The Merrimac River was stocked by Massachusetts and New Hampshire about the same time as the Connecticut. The fishermen there refrained from catching the returning fish, and the result was that last fall 100,000 eggs were taken from the salmon which had returned and passed successfully through fishways provided for them over many high dams. The Commissioners have no doubt that by continuing salmon-planting in the Connecticut they could have ultimately accomplished similar results. It is true, the dam at Holyoke still prevents the passage of the fish to the headwaters of the river for spawning, as the fishway built there by Massachusetts is a failure. And inasmuch as the dam and fishway are beyond the jurisdiction and control of Connecticut, there is little, if any, prospect of improvement in that direction. But there are possibilities connected with the Farmington and Agawam Rivers which encourage the belief that a continuance of the work there will be successful. The Commissioners earnestly recommend that the appropriation be continued for that purpose. At Bucksport the work goes on as usual, for the benefit of Massachusetts and the United States Government, but this year, for the first time since its inception, Connecticut has no part or lot in it.*

* Since the above was written Prof. Baird has generously awarded to the State 250,000 of the Penobscot salmon eggs belonging to the United States Commission—thereby adding another to the many favors heretofore received at his hands. The Commissioners take this occasion to present to Prof. Baird, in behalf of the State and of themselves, their grateful thanks.

LAND-LOCKED SALMON.

The land-locked salmon eggs, from Grand Lake Stream in Maine, came—80,000 January 9th, and 10,000 March 10th, 1880. Of these 710 were dead when unpacked, 4,080 died in the hatching troughs, and 1,400 fry died before distribution. The rest were distributed in good condition in the following-named waters :

Pitsquog Pond, Durham,	-	-	-	-	-	5,000
Higganum Reservoir, Higganum,	-	-	-	-	-	5,000
Rogers' Lake, Lynn,	-	-	-	-	-	5,000
Limepaug Lake, Guilford,	-	-	-	-	-	5,000
Halfway River, Sandy Hook,	-	-	-	-	-	5,000
Canaan Mountain Pond, Falls Village,	-	-	-	-	-	5,000
Kanesiac Pond, Danbury,	-	-	-	-	-	5,000
Still River, Brookfield,	-	-	-	-	-	5,000
Pomparaug River, Woodbury,	-	-	-	-	-	5,000
Perry's Pond, Southport,	-	-	-	-	-	5,000
Mianus River, Mianus,	-	-	-	-	-	5,000
Quasepaug Lake, Middlebury,	-	-	-	-	-	5,000
Plainville Reservoir, Plainville,	-	-	-	-	-	5,000
Black Pond, Meriden,	-	-	-	-	-	5,000
Bolton Reservoir, Bolton,	-	-	-	-	-	5,000
Scantic River, Windsor,	-	-	-	-	-	5,000
Broad Brook, Broadbrook,	-	-	-	-	-	5,000
Salmon River, Granby,	-	-	-	-	-	5,000
Colt's Reservoir, Hartford,	-	-	-	-	-	1,000
Total,	-	-	-	-	-	91,000

The plan hitherto pursued in the distribution of land-locked salmon fry has been to select a few such points and lakes in different parts of the State as seemed especially adapted to the wants of the fish, and to plant a considerable number in each for several successive years, so that the failure or success of the experiment might be sooner demonstrated. For four years this plan has been followed. The same ponds have been stocked each spring with from 5,000 to 10,000 young fish. The names of these ponds may be found in any recent report. During the past year the taking of adult salmon from several of them, weighing from $2\frac{1}{2}$ to 4 pounds each, has been reported to the Commissioners, thereby proving that these waters are well-suited to the growth of this excellent fish. Snipsic Lake, in

Rockville, and Long Lake, in West Winsted, have produced fine specimens. Mr. James Bill, of Lyme, showed to members of the Legislature, last winter, one that weighed $2\frac{1}{2}$ pounds, taken from Hog Lake, in Lyme, through the ice. In May, 1880, one weighing *four* pounds was taken from Twin Lakes in Salisbury. The vigorous growth of this fish in so many places in the State has created a great demand for the young fry, which has been met as far as possible, as will be seen from the list of streams and ponds above given. The supply, however, was inadequate, and many applicants were put off until a new supply could be obtained. For this purpose a sum, larger than usual has been devoted to this branch of the work the past year, so that a much larger number of fish will be in hand for supplying all reasonable demands in the spring. Under favorable circumstances the growth of the land-locked salmon is very rapid. In May, 1879, 5,000 young fish were placed in a small brook running into West Hartford Reservoir, and on July 28, 1880, one was taken with a hook which weighed one pound and two ounces! It could not have been more than fifteen months old. Ordinarily at that age, in the waters of this State, this fish does not exceed four ounces in weight.

The operations for procuring the land-locked salmon have been continued at Grand Lake Stream in Maine, as usual, the past year, under the direction of Charles G. Atkins, Esq., for the joint account and benefit of the United States Commission, and the States of Massachusetts and Connecticut. Mr. Atkins' scientific attainments, large experience, and peculiar aptitude for this work, have placed him in the foremost rank of successful fish culturists. The Commissioners feel that special acknowledgment should be made in their Report as justly due to Mr. Atkins for the essential aid he has always afforded the Commissioners in their many years' labors. His great intelligence and skill are surpassed only by his uniformly genial and obliging temper.

His success the past season will be seen on perusal of the following letters :

GRAND LAKE STREAM, Nov. 6, 1880.

ROBT. G. PIKE, ESQ., Middletown, Conn.

MY DEAR SIR:—We have had two nights' fishing and taken 411 Schoodic salmon, of which 177 are females. Forty-two of these have proved ripe and yielded us about 70,000 eggs; those remaining will give us some 180,000 eggs more. The fish are larger than usual and yield more eggs per fish. Impossible to foretell the net result of the season's work—probably not better than last year. Very truly yours,

CHAS. G. ATKINS.

Nov. 14, 1880.

MY DEAR SIR:—We have taken, to date, over 2,000 Schoodic salmon, averaging $2\frac{1}{2}$ to 3 lbs. weight; 1,243,000 eggs already secured, and I have reason to expect, from the fish on hand, enough to swell the number to 2,000,000.

We have had fine weather, and little of the usual discomfort attending the work. But we may have severe weather before we get through.

Very truly yours,

CHAS. G. ATKINS.

ROBT. G. PIKE, Esq., *Com'r. Fisheries, Middletown, Conn.*

Nov. 23, 1880.

DEAR DOCTOR:—About 2,375,000 eggs in all. I hope the losses and reserve will not cut this down to lower than 1,530,000. On that basis your share will be about 480,000. I have been compelled to revise my estimates of expenses. Total now estimated at \$2,550, and you have $2550^{\frac{800}{550}}$. Shall begin to ship them in January—early, if possible.

Penobscot eggs will probably be 1,700,000 or more. Your share—oh, no! you are not there.

Very truly yours,

CHAS. G. ATKINS.

DR. W. M. HUDSON, *Com'r. Fisheries, Hartford, Conn.*

It is obvious from these letters that a much larger supply of Schoodic salmon eggs has been procured than last year—more than double—and the number coming to this State for planting next spring will probably meet all demands.*

TROUT. (*Salmo Fontinalis*.)

This State has long been famous for its trout-brooks. Twenty-five or thirty years ago, any fisherman, of ordinary skill, could procure a

* Since this report was prepared, Mr. Atkins has given notice that the share of Connecticut will be 480,000 eggs!

fine basket of good-sized trout, in almost any part of the State, in a day's fishing. The same causes which nearly destroyed the game birds, doubtless, led to the almost entire extermination of the trout. The increased demand for luxuries consequent upon increased wealth and population, and the improved method of capture regardless of future supply, have so reduced the number of these fish, that it is with great difficulty they can be found of any desirable size, and they command such a high price in the market that they are virtually beyond the reach of all but the wealthiest.

Most of the States engaged in fish culture have built expensive hatching-houses within their borders, and have employed Superintendents whose annual salaries exceed the entire appropriation of this State for some years. With such States the breeding of brook-trout has constituted an important part of the work of the Commission. In view of the great expense it would involve, no State hatching-house has ever been built in Connecticut. The Commissioners have so arranged their work as to enable them to dispense with such a building. They have employed experienced local fish culturists, who, under the direction and with the aid of the Commissioners, have always been successful in their operations, and this with a great saving of expense. For some years past the demand for trout has been increasing, and the Commissioners have been urged to add to their ordinary work, the cultivation and distribution of brook-trout for re-stocking depleted streams. After consultation with many prominent Representatives in the Assembly, notice was given in the last annual report, that a limited number, in lots of 5,000 fish, would be supplied this year, delivered free at the hatching-house in Windsor. The notice was immediately followed by a great number of applications from all parts of the State, and in a very short time the whole supply, 110,000, was exhausted. Arrangements have been made by which it is expected that at least 400,000 fry will be gathered for distribution next spring. All applications for them, and for land-locked salmon should be made to some one of the Commissioners on or before March 1st. It should be remembered that land-locked salmon are delivered at the expense of the

Commission at the railroad station nearest to the pond where they are to be placed. The expense from the station to the pond must be borne by the applicant. But trout and carp are delivered free of expense only at the hatching-house, whence they are taken and distributed at the applicant's expense. If applicants desire they can hire an expert for this work at the hatching-house.

The 110,000 young trout were placed in the following named streams during April and May, 1880:

Hammonasset River, Durham,	-	-	-	-	10,000
Grass Hill Brook, Lyme, -	-	-	-	-	5,000
Spring Brook, East Thompson,	-	-	-	-	5,000
Cold Brook, Glastonbury,	-	-	-	-	5,000
Prior Meadow, Enfield, -	-	-	-	-	5,000
Still River, Brookfield, -	-	-	-	-	5,000
Ice Pond, New London, -	-	-	-	-	5,000
Halfway River, Sandy Hook, -	-	-	-	-	5,000
Whaple Brook, East Windsor, -	-	-	-	-	5,000
Goodwin's Brook, East Hartford,	-	-	-	-	5,000
Bissell's Brook, Granby, -	-	-	-	-	5,000
Marsh Brook, Granby, -	-	-	-	-	5,000
Mill Brook, Windsor, -	-	-	-	-	5,000
Iron Oar Brook, Windsor, -	-	-	-	-	5,000
Broadbrook, Broadbrook, -	-	-	-	-	5,000
Beebee Brook, East Lyme, -	-	-	-	-	5,000
Beaver Brook Stream, Haddam, -	-	-	-	-	5,000
Bishop's Brook, New London, -	-	-	-	-	5,000
Five Mile Brook, Birmingham, -	-	-	-	-	5,000
Aspatuck River, Marbledale, -	-	-	-	-	5,000
Silver Creek, Enfield, -	-	-	-	-	5,000
					<hr/>
					110,000

ALEWIVES. (*Alosa Tyrannus*.)

The alewife fishing in the Connecticut River, and its bays and coves, in the early spring, is of considerable importance. The fish are caught in large numbers, are immediately salted, packed in hogsheads, and sent to New York; whence they are shipped to various countries—some going as far as the coast of Africa. The principal run the past year was in April; on the third day of that month two thousand dozen (24,000) fish were taken at one haul of a seine in

Wethersfield Cove ! They generally come when there is a freshet ; and always in large schools. Application was made to the Commissioners by some of the fishermen for permission to use a fine-meshed net for the purpose of catching these fish, as provided in Section 4, chapter xcvi., page 66, of the laws of 1875. As very few shad are running in April, permission was given to use fine-meshed seines until May 15th. A meeting of the Commissioners with the fishermen on their fishing grounds was appointed to be held on the 13th day of May, to witness the hauling of the seines, and then to decide whether the time for using the small-meshed nets should be extended. By that day, however, the cove fishing had been long abandoned and the nets put away for the year ; but on the river, while no alewives had been taken for several weeks, only a few days before the day of the meeting, a new run of fish had commenced, and large numbers were being taken by what is known as "keel-hauling"—that is, by passing a fine-meshed net outside of the shad seine, when the latter is partly drawn in. On examining the catch, of which a wagon load was brought for inspection, a good many *young shad* were found among them about the size of the alewives. This was conclusive ; and it was determined that no extension of time should be allowed, and no fine-meshed net be permitted, in the river in future, later than the 1st day of May. It was wasteful to kill so many young shad in order to capture so few alewives of so little value ; and this, too, *after* the latter had generally ceased to run.

SHAD. (*Alsosa Praestabilis*.)

Smith's fishing ground at Holyoke, Mass., is the only place on the Connecticut River where the artificial hatching of shad has been extensively carried on. Success there has been due, doubtless, to two causes : 1st, The shad that reach there at the close of the fishing season being stopped by the dam, play around in the shallow waters below the dam until they become ripe for spawning ; they are then easily caught and readily yield their ova in abundance : 2d, The mild temperature of the water there at this time of year promotes a rapid and healthy development of the ova. For several years, there-

fore, the ova used for re-stocking the Connecticut were procured at this place. But for the past two years no shad have been hatched there by artificial means. Nothing, however, has interfered with their natural spawning in the river, so that the supply has not entirely ceased.

But artificial hatching is all important for maintaining an abundant supply of shad in our rivers; and there are many reasons why the work should be done, if possible, within the State. To accomplish this object the Commissioners have made every reasonable effort the past year. They have employed Messrs. James Rankin and Robert B. Chalker to engage in the work. They were selected for their general intelligence, long experience in shad fishing, and thorough knowledge of the habits of the fish. Although they failed to procure spawn, they, nevertheless, learned many valuable facts necessary to a solution of the problem, and it is confidently expected that another season's trial will result in success. The following report gives the particulars of their work:

To the Fish Commissioners of Connecticut:

GENTLEMEN—

In respect to our experiments, under your direction, the past season, for propagating shad in the waters of the State, we respectfully report:

On the 25th day of May, seeing that the water in the Connecticut was falling very fast, and fearing that any attempt might fail, as in 1876, at Holyoke, from the same cause, we agreed, with Messrs. Smith and Hale, of Wethersfield, to commence at once, provided the shad were found in proper condition. From the 25th of May until the 20th of June the shad caught were carefully examined—especially those caught in the night—but without finding any ripe fish. The spawn was very backward and unripe. Thus far our fishing was without expense to the State.

After close time commenced, June 20th, we fished at different times on the same fishing grounds, until July 6th, and found, during that time, only one ripe female shad. We made about thirty hauls, and caught 250 shad, all of which were carefully examined. Finding them unripe, we tried to keep them alive in a pound, but they all died in a few hours. The last shad caught were nearly all dead when landed by the seine. The eggs obtained from the only ripe shad caught, as above stated, which was of a large size, were hatched without loss, and the fry let loose into the river.

June 17 we went to Farmington River and hauled the seine twice, catching 18 shad, which were in the same undeveloped condition as at

Wethersfield, and of small size. We then tried fishing with gill nets in deep water, between Deep River and Chester, on the nights of July 12th, 13th, 14th and 15th, using two nets, and each night catching about 100 shad—but we found them in the same undeveloped condition as at Wethersfield.

Before this we had erected a pound about one mile west of the mouth of the Connecticut River and fifty rods from the shore, to see if it were possible to hatch shad in salt water. Into this pound, June 4th, were put 8 shad; June 7th, 12 shad; June 10th, 6 shad. They all lived and remained bright and lively, and became so gentle as to be handled without difficulty. They were thus enclosed until the 25th of June, when they were so far developed as to be fit for taking ripe spawn. But just at this time an unlooked-for enemy appeared and prevented the completion of the experiment. Owing to the previous warm winter the sharks appeared on the shores of the Sound about a month earlier than usual. During the day they attacked the pound and tried to catch the imprisoned shad, causing them to become wild. By the repeated biting of the sharks some of the meshes of the netting were broken and the male shad all escaped. The female shad remained and were nearly all ripe for spawning, and their eggs were perfect. Although the experiment was incomplete, it proved that the shad can be impounded in salt water until ready for spawning, and then their spawn can be obtained in unlimited quantities for transportation and hatching.

At the commencement of our fishing the water of the Connecticut River was very low—about as low as it usually is found in August. The fishermen say that it is not unusual to find shad spawn in their boats after the shad are taken out, but they saw nothing of the kind this season. We have no doubt that the low state of the river and exceedingly high temperature of the water were the cause of the unusual condition of the shad caught in the river. An account of the temperature of the air and water will be forwarded herewith. All of which is respectfully submitted.

JAMES RANKIN.

R. B. CHALKER.

The temperature of the water and air on the days mentioned in foregoing letter was as follows:

At Garner's fish-place, observations taken of the *water* at 7 o'clock A. M. showed: May 18 and 19, 52°; May 20, 54°; May 21, 55°; May 22 and 24, 57°; May 28, 56°; May 29, 58°; June 5, 61°; June 7, 60°; June 7, 60°; June 8, 60°; June 9, 59°; June 10, 60°. Observations of the same water taken at 7 A. M., 12 M., and 6 P. M. showed: July 16, 70°, 73°, 72°; July 17, 71°, 73°, 72°; July 18, 72°, 74°, 73°. Observations taken at the same hours of the day at Wethersfield showed:

AIR.				WATER.			
June 18,	72°	75°	74°	June 18,	78°	78°	76°
June 19,	74°	76°	74°	June 19,	76°	79°	75°
June 20,	73°	77°	75°	June 20,	75°	78°	75°
June 21,	75°	87°	75°	June 21,	76°	78°	76°
June 22,	77°	83°	74°	June 22,	77°	79°	76°
June 23,	76°	85°	75°	June 23,	76°	78°	75°
June 24,	75°	84°	74°	June 24,	74°	77°	76°
June 25,	79°	94°	90°	June 25,	76°	80°	82°
June 26,	77°	92°	77°	June 26,	77°	85°	80°
June 27,	78°	90°	84°	June 27,	79°	84°	82°
June 28,	76°	87°	79°	June 28,	82°	86°	84°
June 29,	82°	83°	78°	June 29,	84°	85°	82°
June 30,	80°	86°	79°	June 30,	87°	84°	82°
July 1,	78°	82°	79°	July 1,	80°	82°	81°
July 2,	67°	72°	72°	July 2,	77°	79°	80°
July 3,	66°	72°	68°	July 3,	78°	78°	76°
July 4,	70°	84°	72°	July 4,	78°	80°	79°
July 5,	74°	84°	70°	July 5,	80°	80°	78°
July 6,	74°	86°	71°	July 6,	80°	81°	79°

At Deep River, observations taken in the night at 7 P. M., 10 P. M., and 12 midnight, showed:

AIR.				WATER.			
July 12,	70°	69°	68°	July 12,	80°	79°	78°
July 13,	73°	72°	72°	July 13,	81°	81°	80°
July 14,	70°	70°	69°	July 14,	80°	80°	79°
July 15,	73°	72°	71°	July 15,	80°	80°	79°

It was the warm winter of 1879-80 that operated to make the water in the river, as above stated, so unusually low and warm throughout the summer—a condition not at all favorable for impounding the fish. If the coming season proves propitious the experiments of confining the spawners in both fresh and salt water will again be tried, and if they remain in good condition and ripen there, the spawn will then be taken and immediately transported to waters most favorable for hatching, and thence they will be distributed in the usual way, wherever wanted.

The low condition of the water in the river also contributed to reduce the catch of shad, generally along the river. A far less number were caught than in the year before, and they were not quite so good in size and quality. The following are returns from the principal fishing places on the river and Sound:

POUNDS.							SHAD.
6	at Old Saybrook, caught,	-	-	-	-	-	57,651
9	at Westbrook and Duck Island, caught,	-	-	-	-	-	85,483
5	at Clinton, caught,	-	-	-	-	-	29,650
9	at Madison, caught,	-	-	-	-	-	3,000
<hr/>							
29	Caught in all,	-	-	-	-	-	175,784

GILL NETS.

10	gill nets at Deep River, caught,	-	-	-	-	8,640
13	" " " Hamburg, caught,	-	-	-	-	14,433
3	" " " Essex, - - -	-	-	-	-	1,452
3	" " Estimate of W. H. Parmlee's, caught,	-	-	-	-	4,000
20	" " at Lyme, - - -	-	-	-	-	18,868
8	" " Old Saybrook, caught, - - -	-	-	-	-	9,112
<hr/>						
57	" " Caught in all, - - -	-	-	-	-	56,505

HAULING SEINES.

11	hauling seines, caught at Essex,	-	-	-	15,762
3	" " " " Lyme,	-	-	-	20,667
1	" " " " Saybrook,	-	-	-	1,200
<hr/>					
15	" " " in all,	-	-	-	37,629

SUMMARY.

29 pounds,	-	-	-	-	-	-	175,784
57 gill nets,	-	-	-	-	-	-	56,505
15 seines,	-	-	-	-	-	-	37,629
<hr/>							
Total,	-	-	-	-	-	-	269,918

With one exception the above figures have been obtained directly from the fishermen:—that exception is W. H. Parmelee, of Essex, who refused information; but the estimate of his fish is probably about right. The above figures are below the real number caught in the Connecticut, as many seine fishermen failed to make their returns. A fair estimate of those thus failing would increase the amount caught to not far from 300,000 shad. If the estimated number of those caught in the other rivers are added, the total of shad caught in the State last season cannot be far from 325,000. The year previous the catch in the State was about 490,000.

CARP.

No fish is more generally cultivated in Europe than the carp. It is ranked there as second only to the salmon and the trout. It was introduced into England in the early part of the 16th century, as appears from the well-known distich:

"Hops and turkies, *carps* and beer,
Came into England all in one year."

Isaak Walton says:

"The carp is the queen of rivers, but was not at first bred, nor hath been long, in England; but is now (A. D. 1653) naturalized."

For some unexplained reason it has not received that attention there which for centuries it has had in Austria and Prussia, and other parts of Central and Southern Europe.

There are three species which have been principally cultivated—the scale carp, with concentrically-arranged scales; the mirror carp, with only three or four rows of scales along its sides; and the leather carp, with few or no scales. Each of these has its advocates, and it is not easy to decide which is the best for cultivation. If genuine species, they are all good. For transportation, however, the leather carp, having no scales, is the most desirable; as slight bruises would work no permanent injury, as with scale fish.

Carp prefer stagnant or quiet waters, with muddy bottoms covered with vegetation, which is their principal food, although they will eat aquatic worms and larvæ, offal from the kitchen, the barn-yard, the slaughter-house and the brewery. In winter they are torpid, huddling together in the deepest water, with their heads buried in the mud. They take no food from the beginning of October to about the end of March, the period varying in length with the latitude of the place. It grows rapidly in the months of May, June, July and August, provided it has plenty of food and suitable water. Too much peat acid spoils the water for them. Warm waters are most favorable for their activity in search of food, and consequently for their rapid growth. They spawn when 3 or 4 years old, beginning early in March and ending about the end of July—sometimes in

August—the time varying with the water and the weather, as a cold temperature in either checks the process. The spawner does not cast her eggs all at once, but in lots of 400 or 500 at a time, at shorter or longer intervals. A fish weighing 4 or 5 pounds will yield 400,000 or 500,000 eggs! These eggs are adhesive, and catch, in masses, upon any object against which they happen to fall. They hatch out in from 12 to 16 days, but if the water is not warm it may take 20 days. The yolk-sac is absorbed in from 3 to 5 days, by which time they begin to move in search of food. In three years, under favorable circumstances, they generally attain to a weight of 3 to 3¼ pounds, but they have frequently been known to reach 2 pounds the first season. They are long-lived and hardy, inoffensive to other fish, and have no special means of defence. Rivers and large lakes have produced the largest fish, weighing 30, 40 and some even 90 pounds—but these are rare.

Mr. J. A. Poppe, of Sonoma, California, in the year 1872, took eighty-three carp of various sizes, from Holstein, Germany, with the design of introducing them to the ponds on his farm in Sonoma. Only five of them survived the journey, and these were the smallest—about eight inches in length. They were placed in his pond in the month of August, 1872, and in the following May they had grown to be 16 inches long, and had produced over 3,000 young fish! Since that time the increase has been very rapid. Two of the original fish still live, and they are two feet long, and weigh about 15 pounds each. The young have also grown rapidly—in one year reaching 6 or 8 pounds. The progeny of these five fish are now scattered over California—some indeed have been planted in the Sandwich Islands and Central America. Mr. Poppe's fish are kept in ponds about 150 feet square and five feet average depth. They were made by digging out marshy and springy land. Mr. Poppe has fed his fish principally on curd from the dairy, but they are fond of barley, wheat, beans, corn, peas and coagulated blood. The expense of keeping is comparatively small, for they live on what might otherwise go to waste. Their flesh is said to have a delicious flavor.

The United States Commissioner, Prof. Baird, introduced carp for

distribution throughout the United States, about four years ago; 130 living fish were brought from Germany in good condition, and from these a large number of young breeders were produced. During the past year upwards of 130,000 have been distributed through the United States. It is estimated that one pair of healthy fish is enough for a one acre pond, producing from 5,000 to 10,000 eggs in a season. Any one wishing to know more of the nature and habits of the carp, and the best methods of cultivation, will find an exhaustive article upon the subject, by Mr. Rudolph Hessel, published in the United States Commissioners' Report, 1875-6; from which some of the foregoing facts have been taken.

Great eagerness has been manifested throughout the United States to secure them for planting; and many applications have been made to your Commissioners to secure them for introduction into such ponds of this State as seemed best suited to their growth. Prof. Baird has kindly supplied the Commissioners with blank applications, which will be sent to any one who asks for them. It should be well understood that the carp is adapted to a class of waters wholly unsuited to salmon or trout. Ponds with rock or sandy bottoms will not answer. Shallow, quiet waters, with muddy bottoms, yielding vegetable growths, are the best; the larger in extent the better, and no other fish should be allowed in the pond. In the ponds made for them at Baltimore and Washington they did well, and it is asserted by those who know, that they will endure our New England winters without detriment.

It is obvious from what has been hereinbefore stated that the carp have exceptionally good qualities,—that they thrive in a wide range of latitudes, and at no distant day they bid fair to constitute a large, if not the largest, proportion of the fish-food of the United States.

Prof. Baird sent to the Commissioners 400 scale carp and 400 leather carp, which have been distributed in lots of twenty each in different parts of the State; a more particular account of which will appear in the next report.

On the 21st day of August last, Mr. G. N. Woodruff, of Sherman, Conn., was appointed Commissioner in place of Hon James A. Bill,

of Lyme. It is due to Mr. Bill that his old associates on the Board should place on record in this report their testimony to the great intelligence, fidelity and efficiency with which he has always discharged the duties of his office during the twelve years of his connection with this Board. In the darkest days of opposition and discouragement his counsel was always bold, cheerful and helpful ; and no little credit is due to him for the successes which have heretofore crowned the work of the Commission.

The financial statement is hereto appended.

Respectfully submitted,

WM. M. HUDSON,	}	<i>Commissioners on Fisheries.</i>
ROBERT G. PIKE,		
G. N. WOODRUFF,		

FINANCIAL STATEMENT.

Balance on hand Jan. 1, 1880, - - - - -	\$810 23
Appropriation of 1880, - - - - -	2,500 00
	\$3,310 23

1880.

April 12, Paid Henry J. Fenton, hatching and distributing Penobscot salmon, -	\$84 50
April 20, Paid Henry J. Fenton, 40,000 trout,	120 00
May 10, Paid Henry J. Fenton, 70,000 trout,	210 00
May 10, Paid Henry J. Fenton, hatching and distributing land-locked salmon, -	201 89
May 14, Paid Chas. G. Atkins, land-locked salmon enterprise, in Maine, -	800 00
May 25, Paid Chalker and Rankin, shad hatching operations, - - - -	549 69
Sept. 30, Paid A. Wilbraham, for 12 new fish cans, and repairing old ones, -	67 60
Oct. 30, Paid R. B. Chalker, collecting shad statistics, - - - - -	25 00
Nov. 25, Paid Henry J. Fenton, managing carp, - - - - -	20 00
Nov. 30, Wm. M. Hudson, expenses, - -	313 60
“ “ “ “ pay, - - -	408 00
“ “ Robert G. Pike, expenses, - -	70 95
“ “ “ “ pay, - - -	222 00
“ “ James A. Bill, expenses, - - -	124 00
“ “ “ “ pay, - - -	93 00

 \$3,310 23

LIST OF FISH COMMISSIONERS.

Canada.

W. F. Whitcher, - - - - Ottawa, Ontario.
 S. Wilmot, Supt. of Fisheries, - - Newcastle, Ontario.

New Brunswick.

W. H. Venning, Inspector of Fisheries, St. John.

Nova Scotia.

W. H. Rogers, Inspector of Fisheries, Amherst.

Prince Edward Island.

J. H. Duvar, Inspector of Fisheries, Alberton.

British Columbia.

A. C. Anderson, Inspector of Fisheries, Victoria.

United States.

Prof. Spencer F. Baird, - - - Washington, D. C.

Alabama.

This State had a Commission last year, but we have been unable to get a reply to letters addressed to them.

California.

S. R. Thockmorton, - - - San Francisco.
 B. B. Redding, - - - " "
 J. D. Farwell, - - - Niles, Alameda Co.

Colorado.

W. E. Sisty, - - - - Brookvale.

Connecticut.

W. M. Hudson, - - - - Hartford.

Robert G. Pike, - - - - Middletown.

G. N. Woodruff, - - - - Sherman.

Georgia.

Thomas P. James, - - - - Atlanta.

(Com. of Agriculture and *ex-officio* of fisheries.)

Illinois.

N. K. Fairbank, - - - - Chicago.

S. P. Bartlett, - - - - Quincy.

(Mr. J. Smith Briggs, of Kankakee, was on the board, but his term has expired and no appointment has been made to date.)

Iowa.

B. F. Shaw, - - - - Anamosa.

Kansas.

D. B. Long, - - - - Ellsworth.

Kentucky.

Hon. John A. Steele, - - - - Midway.

Dr. Wm. Van Antwerp, - - - - Mt. Sterling.

A. H. Goble, - - - - Catlettsburg.

Hon. C. J. Walton, - - - - Munfordville.

Dr. S. W. Coombs, - - - - Bowling Green.

John B. Walker, - - - - Madisonville.

Wm. Griffith, President, - - - - Louisville.

W. C. Price, - - - - Danville.

P. H. Darby, - - - - Princeton.

Hon. J. M. Chambers, - - - - Independence, Kenton Co.

Maine.

E. M. Stillwell,	-	-	-	-	Bangor.
Henry O. Stanley,	-	-	-	-	Dixfield.
(Commissioners of Fisheries and Game.)					

Maryland.

T. B. Ferguson,	-	-	-	-	Baltimore.
(Address 1,327 M street, Washington, D. C.)					
Thomas Hughlett,	-	-	-	-	Easton.

Massachusetts.

Theodore Lyman,	-	-	-	-	Brookline.
E. A. Brackett,	-	-	-	-	Winchester.
Asa French,	-	-	-	-	Boston.

Michigan.

Eli R. Miller,	-	-	-	-	Richland.
A. J. Kellogg,	-	-	-	-	Detroit.
Dr. J. C. Parker,	-	-	-	-	Grand Rapids.

Minnesota.

Daniel Cameron,	-	-	-	-	La Crescent.
Wm. W. Sweeney, M. D.,	-	-	-	-	Red Wing.
R. Ormsby Sweeny, Chm.,	-	-	-	-	St. Paul.

Missouri.

Hon. Silas Woodson, Chm.,	-	-	-	-	St. Joseph.
Hon. H. Clay Ewing,	-	-	-	-	Jefferson City.
John Reid,	-	-	-	-	Lexington.

Nebraska.

R. R. Livingston,	-	-	-	-	Plattsmouth.
H. S. Kaley,	-	-	-	-	Red Cloud.
W. L. May,	-	-	-	-	Fremont.

Nevada.

H. G. Parker,	-	-	-	-	Carson City.
---------------	---	---	---	---	--------------

New Hampshire.

Samuel Webber,	-	-	-	-	Manchester.
Luther Hayes,	-	-	-	-	South Milton.
Albina H. Powers,	-	-	-	-	Plymouth.

New Jersey.

Dr. B. P. Howell,	-	-	-	-	Woodbury.
E. J. Anderson,	-	-	-	-	Trenton.
Theo. Morford,	-	-	-	-	Newton.

New York.

Hon. R. B. Roosevelt,	76 Chambers st.,	New York.
Edward M. Smith,	-	Rochester.
Richard U. Sherman,	-	New Hartford, Oneida Co.
Eugene G. Blackford,	809 Bedford ave.,	Brooklyn.

North Carolina.

P. M. Wilson (Acting Com.),	-	Raleigh.
-----------------------------	---	----------

Ohio.

J. C. Fisher, President,	-	-	-	Coshocton.
R. Cummings, Treasurer,	-	-	-	Toledo.
L. A. Harris, Secretary,	-	-	-	Cincinnati.

Pennsylvania.

H. J. Reeder,	-	-	-	-	Easton.
B. L. Hewit,	-	-	-	-	Holidaysburg.
James Duffy,	-	-	-	-	Marietta.
John Hummel,	-	-	-	-	Selingsgrove.
Robert Dalzell,	-	-	-	-	Pittsburg.
G. M. Miller,	-	-	-	-	Wilkesbarre.

Rhode Island.

Newton Dexter,	-	-	-	-	Providence,
John H. Barden,	-	-	-	-	Rockland.
Alfred A. Reed,	-	-	-	-	Providence.

South Carolina.

A. P. Butler, - - - - - Columbia.
 (Com. of Agriculture and *ex-officio* Com. of Fisheries.)

Tennessee.

W. W. McDowell, - - - - - Memphis.
 Geo. F. Akers, - - - - - Nashville.
 Hon. W. T. Turley, - - - - - Knoxville.

Texas.

J. H. Dinkins, - - - - - Austin.

Utah.

Prof. J. L. Barfoot, (Curator Deseret Museum), Salt Lake City.

Vermont.

Dr. M. Goldsmith, - - - - - Rutland.
 Charles Barrett, - - - - - Grafton.

Virginia.

M. McDonald, - - - - - Lexington.

West Virginia.

Henry B. Miller, - - - - - Wheeling.
 C. S. White, - - - - - Romney.
 N. M. Lowry, - - - - - Hinton.

Wisconsin.

Gov. Wm. E. Smith, (ex-officio), - - - Madison.
 Philo Dunning, (President), - - - Madison.
 J. V. Jones, - - - - - Oshkosh.
 C. L. Valentine, (Secretary and Treas.), - - - Janesville.
 Mark Douglas, - - - - - Melrose, Jackson Co.
 John F. Antisdel, - - - - - Milwaukee.
 Christopher Hutchinson, - - - - - Beetown, Grant Co.

REPORT
OF THE
BOARD OF
CAPITOL COMMISSIONERS,
TO THE
GENERAL ASSEMBLY
OF THE
STATE OF CONNECTICUT.

Printed by Order of the Legislature.

HARTFORD, CONN.:
PRESS OF THE CASE, LOCKWOOD & BRAINARD COMPANY.
1881.

REPORT.

HARTFORD, November 30, 1880.

To His Excellency CHARLES B. ANDREWS,
Governor of the State of Connecticut:

SIR, The Board of Capitol Commissioners have the honor to report:

That since the first of March, 1880, the expenses, in the settlement of the accounts of the contract and the finishing of the work on the New Capitol, have amounted to the sum of one hundred and twenty thousand one hundred and thirteen dollars and fifty-two cents. The receipts and expenditures for the period above named were as follows:

RECEIPTS.

Balance on hand as per last report,	\$16,076.97
From the State of Connecticut on account of Appropriations for building, etc.,	88,131.36
From the city of Hartford,	15,000.00
From the Comptroller for Expenditures for gas fixtures, etc.,	257.50
From miscellaneous sources,	647.69
	<hr/>
	\$120,113.52

EXPENDITURES.

In settlement of claims of J. G. Batterson in accordance with resolution of General Assembly, approved March 25, 1880,	\$113,500
For completion of stone-work, decoration, etc., of building, office expenses, etc.,	\$6,613.52
	<hr/>
	\$120,113.52

General Statement of Accounts.

The total receipts and expenditures on the new Capitol building from the commencement of the work to the 31st of October, 1880, are shown in the following statement.

STATEMENT OF CASH ACCOUNT, OCTOBER 31, 1880.

Dr.

Amount received from the State of Connecticut on	
account of appropriations for building, etc.,	\$2,028,131.36
Amount received from city of Hartford, - - -	500,000.00
" " " sales of materials etc., -	4,608.94
" " " J. G. Batterson, for freight, etc.,	6,461.08
" " " sundry parties, " " "	402.50
" " " comptroller for furniture, etc.,	38,805.18
" " " appropriation for grading	
grounds, - - -	5,138.45
Amount refunded by T. F. Burke, for gold leaf, -	1,131.00
" " for Carpet and fittings, - -	875.89
	<u>\$2,585,554.40</u>

Cr.,

Paid to J. G. Batterson in accordance	
with resolution of General As-	
sembly, approved March 25,	
1880, - - - - -	\$113,500.00
Paid to J. G. Batterson for construc-	
tion, etc., prior to March 1, 1880,	
- - - - -	1,807,157.03
Paid to J. G. Batterson for statuary,	17,450.00
	<u>\$1,938,107.03</u>
Paid to other parties for construction, \$271,358.08	
" " " " " statuary,	29,990.85
" for models for carving, - -	1,843.14
" " decoration of building, - -	34,410.58
" " gilding dome, - -	2,114.14
" " heating and ventilating appara-	
tus, - - - -	52,368.22
Paid for elevator apparatus, - -	4,576.76
" " fire-place fittings, - -	1,164.49

Paid for drinking fountains, - -	\$1,057.56
“ “ water, fuel, and gas, - -	7,804.13
“ “ steam engineer and firemen, -	5,084.84
“ “ watchmen and cleaning building, -	6,900.03
“ “ miscellaneous expenses, - -	865.58
“ “ tools, appliances, etc., - -	611.86
“ “ heating experiments, - -	797.57
“ architect and decorators' fees, superin- tendence, office expenses, etc.,	168,386.18
Paid for alterations and repairs, - -	2,907.44
“ “ completion of work on building after March 1, 1880, - -	2,175 98
	<u>\$594,417.43</u>
Cost of building, - - - - -	\$2,532,524.46
Advanced for freight, models, labor, etc., for contractor, - - -	\$3,414.87
Advanced for freight, labor, etc., for sundry parties, - - -	402.50
Advanced for dome-pier repairs, -	2,766.44
“ “ gold-leaf, - - -	1,131.00
“ “ furniture, etc., - -	38,805.18
“ “ carpet and fittings, -	875.89
“ “ grading grounds, -	5,138.45
“ “ experiments in Hall of Rep- resentatives, ordered by Speaker Wright, -	495.61
	<u>\$53,029.94</u>
	<u><u>\$2,585,554.40</u></u>

The following resolution was passed at the last session of the General Assembly:

STATE OF CONNECTICUT,
OFFICE OF SECRETARY OF STATE.

GENERAL ASSEMBLY, JANUARY SESSION, A. D. 1880.

[House Joint Resolution No. 135.]

[169.]

Awarding Compensation to James G. Batterson.

WHEREAS, Differences exist between the Commissioners for building the new Capitol and James G. Batterson, the contractor,

relative to the sum which is due to him under his contract for the erection of said building: therefore,

Resolved by this Assembly:

SECTION 1. That the sum of one hundred and thirteen thousand five hundred dollars (\$113,500) be and the same is hereby appropriated and awarded to said Batterson by way of compromise of said claims, which sum shall be in full satisfaction and discharge of all claims of said Batterson against the State in any way growing out of said contract, including the sum awarded by said Commissioners.

SEC. 2. The Comptroller shall draw his order on the Treasurer in favor of the President of said Board of Capitol Commissioners for such sum as may be necessary to make such payment, beyond the sums heretofore appropriated for that purpose by the State and by the city of Hartford.

SEC. 3. That before said payment shall be made, said Batterson shall cause all liens upon said building and attachments of funds due him in the hands of said Commissioners to be released and discharged, and shall also execute a receipt in full of all demands against the State arising out of said matters.

SEC. 4. This resolution shall not be binding upon the State unless said Batterson shall signify to the Treasurer his acceptance of the same in writing within sixty days after the rising of the General Assembly.

Approved March 25, 1880.

STATE OF CONNECTICUT, SS.
OFFICE OF SECRETARY OF STATE.

I hereby certify that the foregoing is a true copy of record in this office.

In testimony whereof I have hereunto set my hand, and affixed the seal of said State, at Hartford, this 29th day of March, A. D. 1880.

DAVID TORRANCE,
Secretary of State.

The following is a copy of a letter from J. G. Batterson to the Treasurer of the State of Connecticut:

"HARTFORD, CONN., April 7, 1880.

HON. TALLMADGE BAKER,

Treasurer of the State of Connecticut :

Sir,—I hereby notify you of my acceptance of the sum of one hundred and thirteen thousand five hundred dollars, in settlement of my claims against the State growing out of contract for building a new State House.

Respectfully yours,

(Signed) J. G. BATTERSON.

\$113,500."

The following is a copy of the receipt given by J. G. Batterson for one hundred and thirteen thousand five hundred dollars paid to him by the President of the Capitol Commission, in accordance with the above resolution :

"HARTFORD, CONN., April 7, 1880.

Received from A. E. Burr, Pres., one hundred and thirteen thousand five hundred dollars (\$113,500), in full settlement of all claims under my contract for building a new State House.

(Signed) J. G. BATTERSON.

\$88,131.36

15,000.00

10,368.64

\$113,500.00 "

Since the date of our last report, the following work has been done on the Capitol :—

The carving, trimming, and finish of the marble work has been improved.

Repairs of certain defective parts of the exterior marble and granite work have been made.

The passages, arcades, and interior of the upper part of the main tower, and the groined arches of the outer northern vestibule have been painted. Certain rooms on the fourth floor, including the large one over the Senate Chamber, have been finished in color.

The heating and ventilating apparatus has been completed.

The iron work of the two circular stairs in the main tower

has been completed, including some additional railings put on the lower stair, to make it a safer passage-way for persons unaccustomed to such a height.

The records of the estimates made and received by the Commission, and of the letters, papers, &c., sent out and received, have been put into good order for preservation, and wherever possible, they have been bound into strong volumes, and indices of all these records have been made.

Record plans of four floors of the building have been framed and hung in the office of the State House keeper for the use of State officers and visitors.

The drawings furnished by the architect have been returned to him according to agreement, and the most of the other drawings and designs used in the construction and ornamentation of the building have been returned to the sources from which they emanated. Many tracings and other copies, working drawings, etc., however, remained in the office of the Commission, and these have been turned over to the Comptroller.

The property remaining in the hands of the Commission, and the books, vouchers, papers, etc., etc., of the Commission have been turned over to the Comptroller.

The following resolution was passed at the last session of the General Assembly:—

STATE OF CONNECTICUT,
OFFICE OF SECRETARY OF STATE.

General Assembly, January Session, 1880

[House Joint Resolution, No. 184.]

[186.]

To Compensate the Board of Capitol Commissioners.

Whereas, The Board of Capitol Commissioners have served the State for about six years with great industry and with rare fidelity to a public trust of the highest importance, and have turned over to the State its elegant Capitol, and have thus far received no compensation therefor,

Resolved by this Assembly: That the sum of Fifteen Thousand Dollars is hereby appropriated out of the Public Treasury to said Board of Capitol Commissioners, to be divided as they see fit, and

the Comptroller is authorized to draw his order on the Treasurer in favor of the Chairman of said Board therefor.

Approved March 25th, 1880.

STATE OF CONNECTICUT, SS.
OFFICE OF SECRETARY OF STATE.

I hereby certify that the above is a true copy of record in this office.



In Testimony whereof, I have hereunto set my hand, and affixed the Seal of said State, at Hartford, this 29th day of March, A. D. 1880.

DAVID TORRANCE,
Secretary of State.

The sum of fifteen thousand dollars appropriated by the above resolution to the Capitol Commissioners as compensation for their services has been divided according to the time served and services rendered by each Commissioner. The portions due for services of the two deceased members, Messrs. Dunham and Barber, were paid to the administrators of their estates.

Respectfully submitted,

A. E. BURR.	}	<i>State Capitol Commissioners.</i>
J. HALSEY.		
N. WHEELER.		
W. P. TROWBRIDGE.		
F. CHAMBERLIN.		

REPORT

OF THE

COMMITTEE

FOR

Grading the Capitol Grounds.

Printed by Order of the Legislature.

HARTFORD, CONN.
PRESS OF THE CASE, LOCKWOOD & BRAINARD COMPANY,
1881.

State of Connecticut.

REPORT.

To the Honorable General Assembly of the State of Connecticut.

JANUARY SESSION, A.D. 1881.

The General Assembly of 1878 authorized the Capitol Commission to lay out and grade the Capitol grounds, and appropriated for that purpose the sum of ten thousand dollars.

At the end of the season they had made but little progress, and during the session of 1879 a further appropriation of twenty-five thousand dollars was made, and a committee was appointed, consisting of the Comptroller of the State, and the Board of Park Commissioners of the City of Hartford, with full power to proceed with the work. At the session of 1880, this committee reported their doings, and an additional sum of twenty-five thousand dollars was voted for a continuance of the work, by a committee consisting of the Comptroller, Treasurer, and Secretary of the State, together with the Board of Park Commissioners aforesaid, which committee herewith respectfully submit for your consideration a statement of their doings, with an account of their disbursements.

In entering upon our duties, it was understood that, as far as practicable, all work should be done by contract, under which plan we contracted for the removal of 11,261 yards of earth at 24 cents per cubic yard.

We also contracted for the retaining wall on the river bank, for the sum of \$2,348.27, and the granite platform and steps on the north front of the building for \$1,440.

These contracts, as was the case with some minor ones, were let to the lowest bidder, after public notice had been given, asking for proposals for the work.

In addition to these contracts, there has been a further expenditure of \$8,747.06 on pay-rolls for labor, which can be found in detail in the accompanying schedule, together with items for tools and material that were necessary for the work.

Included in the pay-rolls is the cost of some 5,000 yards of asphalt work for walks, which was done under our own supervision at a cost of \$2,000, which was less than we could contract for it. It is our opinion that the walks will prove to be durable, as they are sustained by a foundation of stone from eighteen to twenty-four inches in depth.

The walks are all finished, except those on the north front of the building, which were delayed for the completion of the granite platform and steps for that section of the building, which work has been prolonged by detention of the material from the quarries in Maine by a marine disaster; they are now on the ground, and we trust that on the presentation of this report they will be set complete.

In addition to this, we have paid the city of Hartford the sum of \$3,613.84, for stoning the roads of the grounds; they have done this work for its actual cost, giving us the material from their quarries, and the use of their extensive apparatus, machinery, and tools free, making no charge except for their payments for labor and cartages.

The roadways are still incomplete, lacking a top dressing of fine material that will cost about two thousand dollars, which with the heavy foundation will make them of great permanence.

This with the curb work necessary to sustain the roads and protect the lawn, as is provided on all the city streets, is all that remains of a constructive nature to be done to the grounds, the planting and the general care being a matter for a separate consideration.

Directly west of these grounds is a section of unoccupied land that forms the bank of the river, and the northern

boundary of Capitol avenue to Lawrence street, extending some 700 feet next west of the west line of the park.

Its proximity makes its annexation to the Capitol grounds almost indispensable, not so much on account of the want of additional land, but for the purpose of preventing the grounds of the Capitol being marred by the erection of unsuitable structures, which must follow, as the land in question is not adapted for a good class of buildings.

The city has taken the preliminary steps to secure this land as an addition to the Capitol grounds, and, as the land damages cannot be large, we are of the opinion that the State should bear a fair part of the cost, as there are no parties on whom an assessment of betterments would lie, the whole object of the improvement being in the interest of the Capitol grounds.

To delay this project must greatly add to its cost, as at this time there are no buildings to remove, the erection of which would make the necessity so apparent that a large sum would have to be paid to secure the improvement.

Up to this time there has been expended by the State on these grounds the sum of sixty thousand dollars; this has been made necessary, as has been mentioned in previous reports, by the necessity of such a change of the grades of the ground as would place the building on its summit. To accomplish this, the entire surface of the ground had to be changed, necessitating heavy expenditures for grading, and the removal of the beautiful grove of trees that formerly graced the grounds of Trinity College, which were many feet above the base of the building.

The city at a large cost reduced the level of Capitol Avenue on the south front of the building, so that there is a fall of three feet in the six hundred feet from the base of the Capitol to Washington street.

Underlying this large tract is a net-work of drains, gas and water-pipes, which are indispensable, but add greatly to the cost of the work.

A comparison of the cost of this work to the State, with the cost of construction and grading the thirty-two acres of

Bushnell Park adjoining, shows that the State has paid sixty thousand dollars for laying out and grading fourteen acres, and the City of Hartford has paid one hundred and ninety thousand dollars for grading thirty-two acres, which in neither case includes the cost of the land. This is about six thousand dollars per acre paid for construction by the City ; a like sum expended by the State would require an appropriation of eighty-four thousand dollars; this illustration is made to show that the appropriation made by the State for this work has not been excessive.

In estimating for the cost of grading and finishing the grounds about a structure of magnitude, where the grounds are proportionate to the building, it is usual to estimate by a percentage of the cost of the structure, five per cent. being the minimum.

That estimate on the cost in this case would amount to over one hundred thousand dollars, forty thousand dollars more than has yet been appropriated by the State.

In view of the large cost of the grounds, and the structure that crowns them, it is our opinion that the plan adopted in the beginning of the work should be carried out. This only lacks completion in finishing the walks, and some five thousand feet of curbing for the roads, such as is required for all road work in the city, with two sets of granite steps on the east front of the grounds on Trinity street, and a top dressing for the roads. The total cost of these improvements, including the necessary contribution by the State for the contemplated extension of the grounds on the west, should not exceed the sum of fifteen thousand dollars.

Our disbursements, with the vouchers for the same, can be found in detail in the Paymaster's report accompanying this. They are as follows:

Cash paid 25 Pay-rolls,	-	-	-	\$8,747.06
" " Roads, Sewers, Walks, and Curbing,				5,694.82
" " Grading account,	-	-	-	4,860.84
" " Gas-pipes, Posts, etc.,	-	-	-	2,035.59
" " Water-pipes, etc.,	-	-	-	59.86

Cash paid Retaining-wall, Engineering and		
Superintendence,	-	\$2,348.27
“ “ Contract for Granite Steps,	-	1,440.00
“ “ Sundry bills,	-	556.78
		<hr/>
		\$25,243.22

All of which is respectfully submitted,

DAVID TORRANCE, *Secretary of State.*

TALLMADGE BAKER, *Treasurer.*

CHAUNCEY HOWARD, *Comptroller.*

S. RUTLEDGE McNARY,	} <i>Park</i> <i>Commissioners.</i>
CHAS. DUDLEY WARNER,	
FRANCIS GOODWIN,	
R. D. HUBBARD,	
GURDON W. RUSSELL,	

REPORT
OF THE
SPECIAL COMMISSION
ON
REVISION OF THE TAX LAWS.

Printed by Order of the Legislature.

HARTFORD, CONN.:
PRESS OF THE CASE, LOCKWOOD & BRAINARD COMPANY.
1881.

State of Connecticut.

REPORT.

To His Excellency CHARLES B. ANDREWS, *Governor.*

SIR :

The Special Commission, consisting of the Treasurer, Comptroller, Secretary of State, and Commissioner of the School Fund, appointed by act of the General Assembly, approved March 25, 1880, to inquire into the conditions and workings of the tax laws of the State, and to report to your Excellency for the information of the General Assembly, what changes, if any, should be made in said laws, beg leave to report as follows :

We have investigated the subject with such care as other duties imposed upon us have permitted, and with the assistance of such suggestions as we have been able to gather and consider from citizens and tax payers, who to some extent have favored us with their views in response to our invitation. Our public hearings were held at a time when an exciting National election engrossed the first feelings of a large portion of the community, so that the presentation of mature thought upon the subject from gentlemen who are competent to make very valuable suggestions was not as complete as we desired, and, as a result, your Commissioners have been forced to make more extensive personal investigations than they anticipated.

The subject is a vast one, and one in which our State has a great interest and which demands from the law-making power immediate and systematic attention and a more thorough examination of details than it has been possible for us to give.

The results of our investigation have been reached with unanimity, and we submit them with the most entire confidence.

CONDITION OF OUR TAX LAWS.

In framing any system of taxation regard must be had to habits and traditions in a government of long standing. A new State, like Nevada or Oregon, ought to start with a system in harmony with the last and very best results of advanced thought and wisest political economy. On the other hand, a State like ours, whose tax laws reach back through two and a half centuries to the infancy of colonial life, and on through the widening of wealth and property, in methods and amounts almost surpassing belief, and through periods of commercial disaster and most expensive war, from times when the wealth of the world was in land and the use and profits of land, to this day, when the sum total of wealth in personal property is vast beyond the industrious estimate of the statisticians, such a State must seek to incorporate the best wisdom of the hour into the actual condition of things, with the least possible friction, holding in respect a reasonable conservatism and still aiming at the blessings of the highest progress.

Property owes a tribute to the State for its protection and security. The traditions of our State,—and here we are in harmony with the best thoughts of the wisest political economy,—admit as a substitute for this tribute some equivalent results from property which is held for certain uses: as church, school, and purely public property. Property which is thus held yields to community a duty and benefit fully equal to a tax tribute, in establishing the peace, good order, and good morals of community, and in the development of industrious, enlightened, and useful citizenship.

The policy of our State has been to make direct taxation upon property. Although a large share of our revenue is derived from taxation which is in form laid upon franchises, as an excise duty owing to community from the privileges and faculty of persons, natural and artificial, enjoying the franchises, still the measure of that tax is in nearly every instance regulated and defined by the amount of property held by such persons. A State so dependent upon corporations, as is ours, for its revenue, could not defend for a

moment its existing taxes upon franchises, excepting that the tax upon their franchise exists only as a form, and that the real subject of taxation is the property held by the tax payers.

To tax the savings banks of the State a quarter of a million dollars a year simply for the privilege of doing business under general or special laws would be an insult to the civilization of the age. While, therefore, the baptismal name of the taxation of savings banks, railroads, mutual insurance companies, etc., is a tax upon their respective franchises, the tax is estimated by, and in fact aimed at, the property held by these institutions.

The historic interpretation of the Federal constitution has been to leave indirect taxation almost exclusively to the National government, and to use direct taxation through the government of the States.

DOUBLE TAXATION.

The subject of double taxation has been discussed by citizens before the Commissioners, and it is claimed by many persons of intelligence that our tax laws which compel holders of personal estate, secured by property which itself pays taxes, to pay taxes upon their investments, are open to the censure of double taxation.

If this claim is correct, it challenges the attention of the General Assembly. Double taxation is offensive and against the general policy of law, but our highest courts hold that it is not void legislation.

The highest authorities differ somewhat upon the question of the liability of these laws to the charge of double taxation.

Our own Supreme Court in *Kirtland vs. Hotchkiss*, 42 Conn., 426, separates the property of the creditor in his loan from the property of the debtor in the subject of the loan or its security. The Supreme Court of the United States in several analogous cases seems to take a similar view.

It is to be noticed that loans secured by mortgage of real estate in Connecticut, and upon which the debtor has assumed taxes, are by our laws now exempt to the extent of the value

of the property pledged. We have also another statute allowing to a debtor a deduction for his indebtedness to a creditor who pays taxes upon the amount of the loan.

The objection to taxing money at interest secured by mortgage comes from holders of this class of property which is secured by real estate outside of our territorial limits.

It does not seem to your Commission that this class of investment is in theory entitled to an exemption, nor that in practice the burden of taxation has been onerous upon it when its rate of interest is considered. It would certainly be unwise to put a premium upon diversions of local capital to other fields of employment under the temptation of high rates of interest by shielding those diversions from contributions to the public expenses.

There is no debt which an individual can incur more sacred than his obligations to pay for the machinery of government which protects his fireside and his person.

SAVINGS BANKS.

The tax upon savings banks is in form a franchise tax, but in fact it is measured by the extent of their assets, and is practically a tax upon their property.

The tax upon these institutions, which ought to be used only for husbanding and preserving in absolute safety the scanty earnings of the poor, was reduced in 1878 from one-half of one per centum upon the amount of deposits to one-fourth of one per centum upon the same property.

There is not, to the knowledge of your commissioners, any serious complaint on the part of these institutions against the results of the present tax, although, as a matter of form and method, the taxation of government bonds, and real estate which bears local taxes, ought to be avoided.

MUTUAL INSURANCE COMPANIES.

A very earnest appeal for relief is made by the mutual life insurance companies.

The rate of tax upon these institutions was substantially the same as the tax upon savings banks, until 1878, when the

savings bank tax was reduced from one-half to one-fourth of one per centum, and the tax upon these companies was left at the former figure.

It is urged that the entire tax is a tax upon prudence and upon losses ; that the tax bears upon vast amounts of real estate, say \$12,000,000, located in other states and upon which the companies have to pay large local taxes ; that the assets of the companies are made up almost wholly by contributions of non-residents ; that the companies are compelled by our own laws to hold assets as a reserve against policy liabilities sufficient to meet liabilities if the investments yield four per centum ; that it is very difficult to obtain safe loans at a rate of interest which will protect the reserve and pay one-half of one per centum tax ; and finally the companies urged that, as Connecticut is the only state which taxes the assets of her home companies, and almost the only one which taxes the home companies at all, our companies are put to a serious disadvantage and the State is thereby a direct loser.

These companies are of course a great benefit and honor to our State, and they have a right to our reasonable protection ; and the motive of policy should at least lead us to protect rather than destroy our own industries and employments.

We present to Your Excellency for the information of the General Assembly some figures which may be regarded as significant upon this point.

PREMIUM INCOME CONNECTICUT COMPANIES.

	1872.	1879.
Ætna Life,	\$4,751,306	\$2,494,187
Connecticut General Life,	288,960	161,721
Connecticut Mutual Life,	7,715,068	5,750,442
Hartford Life and Annuity,	221,251	67,188
Continental Life,	800,886	318,976
Phoenix Mutual Life,	2,942,590	1,054,526

PREMIUM INCOME COMPANIES OF OTHER STATES.

	1872.	1879.
Mutual Life, New York, - - -	\$14,386,864	\$12,687,882
Equitable Life, New York, - -	7,426,862	6,396,400
New York Life, New York, - -	6,277,326	6,003,036
Manhattan Life, New York, - -	1,635,674	933,672
Washington Life, New York, - -	1,032,413	965,383
Mutual Benefit, New Jersey, - -	5,344,940	3,793,704
Northwestern, Wisconsin, - -	2,939,579	1,860,978
Penn Mutual, Pennsylvania, - -	877,080	1,054,861
Massachusetts Mutual, Mass., - -	1,320,432	780,256
	<u>\$41,241,188</u>	<u>\$34,476,172</u>

From this statement, it appears that the decrease in the Connecticut Companies in seven years was — per cent., and that of the other companies named, the decrease was — per cent.

We would also submit a statement of the number of new policies issued by the same companies in the years 1872 and 1879:

POLICIES ISSUED BY CONNECTICUT COMPANIES.

	1872.	1879.
Ætna Life, - - - - -	8,791	4,253
Connecticut General Life, - - -	1,275	597
Connecticut Mutual Life, - - -	5,520	5,154
Hartford Life and Annuity, - - -	1,216	283
Phoenix Mutual Life, - - - - -	10,690	1,895
	<u>36,177</u>	<u>14,234</u>

POLICIES ISSUED BY COMPANIES OF OTHER STATES.

	1872.	1879.
Mutual Life, New York, - - - -	12,184	12,210
Equitable Life, New York, - - -	12,491	7,483
New York Life, New York, - - -	8,910	5,524
Manhattan Life, New York, - - -	1,701	1,049
Washington Life, New York, - - -	2,268	1,432
Mutual Benefit, New Jersey, - - -	3,172	3,368
Northwestern, Wisconsin, - - -	6,487	3,739
Penn Mutual, Pennsylvania, - - -	794	1,732
Massachusetts Mutual, Mass., - - -	3,204	1,012
	<u>51,211</u>	<u>37,549</u>

From this it appears that the decrease in the case of Connecticut Companies was over — per cent., and that of other companies named — per cent.

This falling off in business is doubtless due to financial depression, and the difficulties which the life insurance companies of this country have had to surmount since 1872; but the marked difference in the experience of the companies of Connecticut, and of those of other states, must be due to some special cause; and it is earnestly claimed that the tax levied by this State upon our companies has contributed largely to this result.

As the business of these institutions is wholly derived from soliciting agents, it is claimed that the taxes which our companies have to bear are formidable arguments against our own companies, upon the quick tongues of the agents of their rivals.

The Commission is of opinion that at least the real estate of said companies situated outside of this State and acquired by foreclosure of mortgages and which bears its full share of local taxation should be exempt from taxation in this State.

RAILROAD COMPANIES.

The companies pay a tax of one per centum upon the market value of their stock and upon the amount of their funded and floating debt. The tax is theoretically upon their franchise and practically upon the value of their property.

If other property in the State is appraised at its value as this property practically is by the standard established by law, and if one per centum is a fair average of general taxes, then the law is right. A trading company, like a railroad company, should pay equally with and no more than other trading companies and individuals. An artificial person in trade and a natural person in trade should pay equal tribute for the protection of their property. Owing to the underestimates given to personal property, the railroad companies are in fact taxed more heavily than prosperous individual traders, whose merchandise and other personal property scarcely ever gets upon an assessment list at its fair value.

On the other hand great clemency has been shown in remitting and postponing taxes due from weak companies. It is difficult for us to see why a weak railroad company should not pay a reasonable tax as certainly as it pays for its transportation expenses and officers' salaries.

REAL ESTATE.

The real property of the State is listed at very unequal rates ; in some places a valuation nearly approaching truth is made, in other places land goes into the list at less than half its true value.

PERSONAL ESTATE.

To some extent personal property is unequally and capriciously assessed. In this connection it is well to remember that the Federal laws make void all State laws which impose a discriminating or unequal tax upon the shares of National Banks. The State therefore has a great interest in having the tax laws bearing upon personal property of substantial equality and fairness.

How shall the assessed value of property be equalized?

This is a wide question. Doubtless much can be done by an improved administration of existing laws. But other legislation is needed. Penalties for failure to make lists and for imperfect valuation can be increased. The official term of assessors can be lengthened, as it has been, it is thought advantageously, in one or two towns. A tax commissioner with revisory power may be appointed, and his powers may be supplemented by proper laws to make his action effective. Very forcible arguments will occur to the members of the General Assembly in favor of each of these items, but none of them is altogether free from objection.

In the opinion of your Commissioners, property held for purposes of trade and profit, whether owned by individuals or companies and whether it be in its nature real or personal, should be assessed upon some common and uniform valuation. This elemental principle has been wisely incorporated into several of our modern State constitutions. It should not be forgotten that all operations of tax laws are a part of the

machinery of State government, whether the State acts directly through its immediate agents, or whether the tax is collected through the machinery of municipalities.

THE STATE DEBT AND EXPENSES.

The last twenty years have been years of vast expenses. Our own contribution, most generously and promptly met, for the expenses of the war for the maintenance of our civil government, and the great outlay for our Capitol, are of course extraordinary expenses. Each generation should meet its ordinary expenses and should contribute freely to meet extraordinary ones, but there is no sense or propriety in imposing upon this generation and its industries the entire burden of the immense extraordinary expenses incurred in its day both for its own benefit and the benefit of the great and hopeful future. The State debt and extraordinary municipal debt should be gradually diminished. While there will be earnest calls for appropriations from time to time, with fair economy and a reasonable increase in the value of our industries and property, the percentage of taxation can and ought to be reduced.

In view of the gross inequalities of our valuations, of the imperfections of our statutes relating to boards of equalization, of the excessive taxes now bearing upon some persons, natural and artificial, we earnestly recommend the immediate appointment of a wise and competent commission to prepare in detail for the consideration of the next Legislature a complete and perfect tax law in place of our present legislation which with many merits and demerits is quite like a piece of patch-work.

Meantime, if the General Assembly will correct any one of the evils suggested in this report, they will take one step in the line of the best interests of the State.

Possibly the Legislature may be inclined to make a fundamental change, and adopt a system of taxation upon a basis radically new, embodying the theories of men who have made taxation the study of a life-time. This may remedy the evils complained of by tax-payers everywhere. But should they prefer a temporary expedient, and retain the loose system

now in the Statutes, with the cherished traditions of the people, and the experience of many years,—in that case, we earnestly recommend the appointment of a *Tax Commissioner*, with revisory powers; and we herewith submit a bill providing for his appointment, with an outline of his powers and duties.

Respectfully submitted,

TALLMADGE BAKER, *Treasurer*.

CHAUNCEY HOWARD, *Comptroller*.

DAVID TORRANCE, *Secretary of State*.

HARTFORD, Dec. 1, 1880.

I fully concur in the foregoing report, and also in the provisions of the proposed bill for a public act, with the exception that I would confer the power of the appointment of the Tax Commissioner upon the General Assembly, instead of in the manner provided for in said bill.

HENRY C. MILES,

Commissioner of the School Fund.

STATE OF CONNECTICUT,

GENERAL ASSEMBLY, JANUARY SESSION, 1881.

AN ACT CONCERNING TAXATION.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

SECTION 1. The Governor shall, once in every three years, commencing in 1881, and within sixty days after the organization of the General Assembly, nominate, and, with the advice and consent of the Senate, shall appoint a Tax Commissioner, who shall hold office for three years from the first day of July in the year in which he is appointed, unless sooner removed by the Governor for cause; and the Governor shall fill any vacancy occurring during said three years, for the unexpired portion of said term, apprising the Senate, if in session, otherwise at the opening of its next session, of such appointment; provided that the person appointed to fill such vacancy shall cease to hold the office after sixty days from the time when the Senate is apprised of his appointment, unless they, within said sixty days, give their consent thereto.

SEC. 2. Said Tax Commissioner shall, before entering upon the duties of his office, take the oath by law provided for executive and judicial officers; and in the performance of his duties he shall have power to administer oaths to any person.

SEC. 3. The Tax Commissioner shall visit every town in the State at least once during his term of office, and inquire into the manner in which the laws relating to the listing and assessment of property taxable therein are executed by the Assessors and Board of Relief, and whether all persons and property taxable in such towns are, in fact, justly assessed and taxed, and whether all taxes which are due and collectible are, in fact, collected; and for the purpose of such inquiry he shall have power to summon any persons in such town before him, and examine them under oath, to be administered by him, and to compel the attendance of any such witnesses, and the production of books and papers, by suitable process. If any person disobeys such process, or, having appeared in obedience thereto, refuses to answer any question put to him by the Commissioner, the Commissioner may apply in writing to any Judge of the Superior Court, who shall cause such person to come before him, and shall inquire into the facts set forth in such application, and may thereupon commit such person to jail until he shall comply with the provisions of this section.

SEC. 4. The Tax Commissioner shall be a member of the State Board of Equalization, and shall annually report to said Board the results of his official inquiries. He shall also make an annual report to the General Assembly, in which he shall mention any imperfections in the laws as to taxation, or in their execution, which he may think proper to bring to the notice of the Assembly, and from time to time may suggest any further statutory provisions which he may deem desirable.

SEC. 5. The Tax Commissioner shall receive an annual salary of _____ dollars, and also his traveling and incidental expenses necessarily incurred in the performance of his official duties, his account for the same being first audited and allowed by the Comptroller.

SEC. 6. The modes of summoning witnesses before the Tax Commissioner shall be the same as practiced by Justices of the Peace in summoning witnesses in the trial of a civil action, and all fees and mileage due witnesses, or for the service of a subpoena or capias issued by the Commissioner, or by a Judge of the Superior Court upon the application of the Commissioner, shall be paid by him, and allowed him as part of his incidental expenses.

International Exhibition, Paris, 1878.

REPORT

UPON THE

CONNECTICUT EXHIBITS

AT

PARIS, 1878.

BY

WILLIAM P. BLAKE,
HONORARY COMMISSIONER OF THE UNITED STATES.

Published in accordance with the Resolution of the Legislature of the State of Connecticut.

NEW HAVEN:
TUTTLE, MOREHOUSE & TAYLOR.
1880.

HIS EXCELLENCY,

Governor of the State of Connecticut.

SIR :

I have the honor to submit a Report upon the representation of the industries of Connecticut at Paris in 1878, and of the awards decreed to the exhibitors.

Very respectfully,

Your obedient servant,

WM. P. BLAKE.

MILL ROCK,

NEW HAVEN.

March 14, 1879.

International Exhibition, Paris, 1878.

HONORARY COMMISSIONERS OF THE UNITED STATES,

*Nominated by the Governor of the State of Connecticut, and appointed
by the President of the United States.*

WILLIAM P. BLAKE, New Haven.

HENRY C. WHITE, Hartford.

CONNECTICUT BOARD OF MANAGERS.

Ex-officio.

RICHARD D. HUBBARD, *Gov. of Connecticut*, Hartford.

JOSEPH R. HAWLEY, *U. S. C. Com'r*, Hartford.

WILLIAM P. BLAKE, *U. S. C. Com'r*, New Haven.

JOHN E. EARLE, New Haven.

CHARLES DURAND, Ansonia.

LORENZO BLACKSTONE, Norwich.

JOHN T. ROCKWELL, West Winsted.

WILLIAM FAXON, Hartford.

President.

RICHARD D. HUBBARD.

Vice Presidents.

WILLIAM FAXON, CHARLES DURAND.

Treasurer.

JOHN E. EARLE.

Secretary.

WILLIAM P. BLAKE.

CONNECTICUT EXHIBITS

AT THE

PARIS UNIVERSAL EXHIBITION,

1878.

At the Universal Exhibition at Paris in the year 1878 there were fifty-eight exhibitors from the State of Connecticut. In some instances objects manufactured in the State were entered as from New York. The annexed alphabetical list is believed to include all. At the Exhibition in Paris, in 1867, there were twenty-five exhibitors, and at the Vienna Exhibition, in 1873, there were twenty-nine from Connecticut.

At the Paris Exhibition, in 1867, the Connecticut exhibitors received nineteen awards; at Vienna, in 1873, twenty-seven, and at Paris, in 1878, sixty-two. This plurality is accounted for by the fact that some of the exhibitors received several medals. They sent such a variety of products that these products were separately classed and judged by different group juries. They were, in effect, so many different exhibits though not separately exhibited in distinctly different cases or in different parts of the exhibition.

LIST OF EXHIBITORS

AT THE PARIS EXHIBITION OF 1878, FROM THE STATE
OF CONNECTICUT.

[IN ALPHABETICAL ORDER.]

ANSONIA CLOCK CO., Ansonia. Clocks and Movements.

Bronze Medal.

BAILEY, LEONARD AND CO., Hartford. Adjustable Iron Bench Planes, Try Squares and Bevels, Box Scrapers and Spoke-Shaves. Classes 43 and 59.

Bronze Medal.

BARNARD, HENRY, LL.D., Hartford. "The American Journal of Education," 1856-1877, 26 large octavo volumes. Class 6.

Gold Medal.

BARNUM RICHARDSON COMPANY, Lime Rock. Salisbury Iron Ores, Charcoal Pig Iron, Car Wheels, &c. Classes 43 and 64.

Gold Medal and Bronze Medal.

BAXTER PORTABLE STEAM ENGINE CO., Tho^s. J. Fales, agent, New York. Made in Hartford. Baxter Portable Steam Engines, of 2, 4, 8 and 10-horse power. One 6-horse power Engine for use of Commission. Class 54.

BEVIN BROS. MANUFACTURING CO., East Hampton. Bells, Sleigh, House, Hand, Gong, Brass Kettles, etc. Class 43.

Silver Medal.

BLAKE CRUSHER CO., New Haven. Working Model of Blake's Patent Stone and Ore Crusher; a Machine for reducing rapidly and economically large pieces of Stone, or other hard and brittle substances, by the use of upright, convergent jaws, one of which has a short, vibratory motion. Class 55.

Silver Medal.

GOLD, T. S., West Cornwall. Buckwheat. Class 69.

Honorable Mention.

HOTCHKISS, B. B., Paris and Connecticut. Revolving Cannon. Class 68. *Gold Medal.*

JEWEL (P.) AND SONS, Hartford. Leather and Leather Machine Belting. Classes 49 and 54.

MCCURDY, (C. J.), Lyme. Granite. A Rose-colored Granite, with large Crystals. *Honorable Mention.*

MALLORY, WHEELER AND CO., New Haven. Reversible Door Locks, Wrought Iron Padlocks, Door Knobs and Handles in "Mineral," Porcelain and Bronze. Class 43. *Gold Medal.*

MANNING, BOWMAN AND CO., West Meriden. Silver, Nickel and White Metal Mountings on Sheet Metal Ware, &c. Class 43.

MANVILLE COMPANY, Cambrie Linings. Class 30.

Silver Medal.

MERIDEN FLINT GLASS WORKS, West Meriden. Cut Glass, Table and Decorated Ware. Class 19. *Honorable Mention.*

MOWER, E., Roxbury Station. Granite. One Twelve-inch Cube, sample of Granite used for Building and Ornamental Purposes. *Honorable Mention.*

NEW ENGLAND GRANITE WORKS, Hartford. Vase of Polished "Westerly" Granite. Three Twelve-inch Cubes of Granite, samples of Stone used for Buildings and for Statues. Classes 43 and 66. *Two Bronze Medals.*

BRADLEY, G. W., Hamden. Corn, in the ear, on the stalk.

Honorable Mention.

BROOKS, EZRA, Hartford. "Hartford" Automatic Pumps, worked by Wind Power or by Steam. Class 54.

Bronze Medal.

CASE BROTHERS, South Manchester. Press Boards, for Printers' use. Class 10. *Bronze Medal.*

CLARKE, E. B., Middlefield. Agricultural Products. Class 69. *Bronze Medal.*

COLLENDER, H. W., New York City and Stamford. Billiard Table, with Markers, Cue Racks, &c. Class 17.

Silver Medal.

COLLINS AND CO., Hartford. Axes, Machetes, and Edge Tools. *Gold Medal.*

COLT'S PATENT FIRE ARMS CO., Hartford. Guns and Pistols. *Bronze Medal.*

CONNECTICUT BOARD OF AGRICULTURE, Hartford. P. M. Augur, Secretary of State Board of Agriculture, Middlefield. Oats, Corn, Wheat, Rye, Beans, &c. Case of 18 ears of Corn, the product of 3 grains. Leaf Tobacco. Classes 46 and 69.

CONNECTICUT STATE DEPARTMENT OF PUBLIC INSTRUCTION, Connecticut. B. G. Northrop, Secretary of State Board of Education, New Haven. Set of Reports of the Board of Education, 12 vols. Class 6.

DOUGLAS, W. AND B., Middletown. Pumps of all descriptions, both Hand and Power; for house, factory, yard or farm use. Hydraulic Rams, Garden Engines, Drive Well Pumps, and Points, Grindstone Frames, and Trimmings, Yard Hydrants, and Street Washers. Classes 54 and 85.

Bronze Medal and Silver Medal.

GATLING GUN CO., Hartford. 1 Gatling Gun, mounted on Tripod; 1 Ten Barrel 1-inch Gatling Gun; 1 Medium-sized Gatling Gun on Field Carriage. Class 68. *Silver Medal.*

NEW HAVEN, CONNECTICUT, PUBLIC SCHOOLS, Ariel Parish, Superintendent. City School Reports, 1 vol. Class 6.

NEW HAVEN WHEEL CO., New Haven. Carriage, Cart, Wagon and Truck Wheels, and Wheel Materials of American Woods, for Home use and for Export. Class 62. *Silver Medal.*

NORTHFIELD KNIFE CO., Northfield. Pocket Cutlery. Class 23. *Bronze Medal.*

PAGE (W. H.) WOOD TYPE CO., Norwich. Specimens of Wood Printing Type, and Printing from the same. Class 60.

Honorable Mention.

PARKER, JOSEPH AND SON, New Haven. Blotting Paper in the collective exhibit of Woolworth and Graham.

Bronze Medal.

PETERS' COMBINATION LOCK CO., Waterbury. Combination Locks for Drawers, Post Offices, Padlocks, Safes, &c. Class 43. *Honorable Mention.*

PICKERING, (T. R.) AND CO., Portland. Steam Engine Governors with Improved Automatic Stop Motion, and Speed Ad-

juster. For use of Commission on Engines in U. S. Section.
Class 54. *Bronze Medal.*

REDPATH, F. W., Stony Creek. Granite for Building and Monumental purposes. Red Granite. *Honorable Mention.*

RICHARDS, CHAS. B., Hartford. Indicator, for Steam Engines, for presentation to the "Conservatoire des Arts et Mé-tiers," Paris, at close of Exhibition. Class 54. *Silver Medal.*

ROGERS, (C. B.) AND CO., New York City. Norwich Wood Working Machinery, Band and Scroll Saws. Planer. Class 59. *Honorable Mention.*

RUSSELL AND ERWIN MANUFACTURING CO., New Britain. An assortment of all the various qualities and styles of Builders' Cabinet, and General Hardware and Tools, including a great variety of Door Locks, Padlocks, Handles, Bolts, Hinges Fire-irons, Pulleys, Sheaves, Chisels, Screw-drivers, Wrenches and general tools. Artistic fittings in Statuary, Bronze, Nickel, Gold, and Enamel, for Door, Window and Fire-place Decoration. Classes 11, 25, 43, 59 and 66. *Two Gold Medals, one Honorable Mention and Two Bronze Medals.*

SEWARD (M.) AND SON, New Haven. Carriage Hardware. Class 62. *Bronze Medal.*

SHARP'S RIFLE COMPANY, Bridgeport. Breech-loading Military and Sporting Rifles. Classes 40 and 68. *Two Silver Medals.*

SHONINGER (B.) PIANO AND ORGAN CO., New Haven. Universal, Upright, or Boudoir Pianofortes. Universal, Cymbella, Chorale, Capella, Eureka and Paragon Organs. Class 13. *Bronze Medal.*

SLATER, JOHN F., Jewett City. Cheviot Shirtings. Class 30. *Bronze Medal.*

SMITH AND EGGE MANUFACTURING CO., Bridgeport. Locks of various kinds, Automatically made Window Sash Chains, Specialties in Hardware, and Light Metallic Goods in general. Class 43. *Bronze Medal.*

STANLEY RULE AND LEVEL CO., New Britain. Carpenters' Tools. Classes 15 and 59. Class 59, *Bronze Medal.*

STEVENS (THE J. E.) CO., Cromwell. Iron Toys. Class 42.

STEPHENS PATENT VISE CO., New York City and Meriden.
Vises and Attachments, and Planer Chucks. Class 55.

Bronze Medal.

THOMAS (SETH) CLOCK CO., Thomaston and New York City. Tower, Church, House and Marine Clocks. Class 26.

Silver Medal.

UNDERWOOD BELTING CO., Tolland. Main Belts, for use of Commission. One 24 inches wide; one 18 inches wide in use in Machinery Gallery. Two Angular Belts in Agricultural Hall. Classes 49 and 54.

Bronze Medal.

UNION METALLIC CARTRIDGE CO., Bridgeport. Metallic Cartridges. Class 68.

Silver Medal.

VICTOR SEWING MACHINE CO., Middletown. Drill Chucks and Micrometer Callipers. Class 55.

Bronze Medal.

WATERBURY BUTTON CO., Waterbury. Metallic Buttons, Army, Navy and other Special Designs. Class 37.

Honorable Mention.

WAVERLY MILLS, P. Adams, Burnside, Woolworth and Graham, Agents, N. Y. Book Printing Paper. Class 10.

WHEELER AND WILSON MANUFACTURING CO., New York City. Manufactory, Bridgeport. Machines for General Use, Attachments for Machines and Cabinet Work, Sewing Machines used for Industrial Education, Machines for Sewing Books, Specimens of Work made with Machines. Classes 7, 37, 44, 54, 58, 61.

Honorable Mention.

Class 37, *Bronze Medal.* Class 58, *Grand Prize.*

WHITON, D. E., West Stafford. Lathe Chucks, Gear Cutters, Centring Machines. Class 55.

WILLIMANTIC LINEN CO., Hartford. Spool Cotton. Class 30.

Silver Medal.

YALE LOCK CO., Stamford. Section of Post Office Locks, Bronze Hardware, Time and Bank Locks. Classes 43 and 66.

Silver Medal and Gold Medal.

SOURCES AND VARIETY OF THE EXHIBITS.

These exhibits, as will be seen by the list, were chiefly from the towns of Hartford, New Haven, Bridgeport, New Britain, Stamford, Middletown and Meriden, but almost every part of the State was represented. The mining and quarrying industry was shown by ores, iron and car-wheels from Salisbury; by granite from Roxbury, Stony Creek, Lyme, and the quarries at Westerly, of the New England Granite Co. of Hartford. The Agriculture of the State was illustrated by the contributions of cereals, beans and tobacco, from P. M. Augur, of the Connecticut Board of Agriculture, and by exhibits from E. B. Clarke, of Middlefield, by maize from Hamden, and buckwheat from West Cornwall. The educational institutions were made better known through the coöperation of the State Department of Public Instruction, B. G. Northrop, Secretary, and by Barnard's Journal of Education, and other publications. The textile industry was represented by the Cheviot shirtings from John G. Slater, of Jewett City; the cambries of the Manville Company, and the thread of Willimantic. The silk manufacture was indirectly shown by silken flags contributed for the decoration of the American Section by the Cheney Brothers, of South Manchester, but not entered for exhibition.

Clocks were sent from Ansonia and Thomaston; pocket cutlery from Northfield, bells from East Hampton, buttons from Waterbury, and wood-working machinery from Norwich. The descriptive notices which follow, mention the exhibits in their proper order, according to the classification, an outline of which is annexed.* The Connecticut exhibits in fact, constituted a large part of what was sent from the United States, and were in every instance highly creditable as products, and in a national point of view.

* Neither time or adequate information have permitted a full notice of every exhibit.

VALUE OF THE EXHIBITION TO THE STATE AND NATION.

We are apt, perhaps, to lose sight of the great national value of a well selected exhibition of our manufactures abroad. It is not only those who exhibit who are benefited, but the advantages are universal. The industries of the whole country are greatly indebted to the few enterprising manufacturers who incurred the great expense and risk of exhibiting. The burden of sustaining and increasing the reputation of the United States as the source of the most novel and desirable practical inventions fell chiefly upon them, but the advantages are participated in by all our manufacturers. We cannot then too highly honor the exhibitors by proper notices, for they have rendered a great public service, benefiting their neighbors and the State as well as themselves.

SYSTEM OF CLASSIFICATION,

WITH A LIST OF CONNECTICUT EXHIBITORS IN EACH
CLASS, AND THE AWARDS GIVEN.

FIRST GROUP.—WORKS OF ART.

Class 1.—Oil Paintings.

Weir, John F., New Haven.

Class 2.—Various Paintings and Drawings.

Class 3.—Sculpture and Die Sinking.

Class 4.—Architectural Drawings and Models.

Class 5.—Engravings and Lithographs.

SECOND GROUP.—EDUCATION AND INSTRUCTION, APPARATUS
AND PROCESSES OF THE LIBERAL ARTS.

Class 6.—Education of Children, Primary Instruction, Instruction of Adults.

Barnard, Henry, Hartford. *Gold Medal.*

Connecticut State Department of Public Instruction. New Haven Public Schools, Ariel Parish, Superintendent.

Class 7.—Organization and Appliances for Secondary Instruction.

Wheeler & Wilson Mfg. Co., Bridgeport.

Honorable Mention.

Class 8.—Organization, Methods, and Appliances for Superior Instruction.

Class 9.—Printing, Books.

Class 10.—Stationery, Book-binding, Painting, and Drawing Materials.

Case Bros., South Manchester. *Bronze Medal.*

Parker (Joseph) & Son, New Haven.

Bronze Medal.

Waverly Mills, P. Adams, Burnside.

Class 11.—General Application of the Arts of Drawing and Modeling. Russell & Erwin Manufact'ng Co., New Britain.

Bronze Medal.

Class 12.—Photographic Proofs and Apparatus.

Class 13.—Musical Instruments.

Shoninger (B.) Piano and Organ Co., New Haven.

Bronze Medal.

Class 14.—Medicine, Hygiene, and Public Relief.

Class 15.—Mathematical and Philosophical Instruments.

Stanley Rule and Level Company, New Britain.

Class 16.—Maps, and Geographical and Cosmographical Apparatus.

THIRD GROUP.—FURNITURE AND ACCESSORIES.

Class 17.—Cheap and Fancy Furniture.

Collender (H. W.), Stamford and New York.

Silver Medal.

Wheeler & Wilson Mfg. Co., Bridgeport.

Bronze Medal.

Class 18.—Upholsterers' and Decorators' Work.

Class 19.—Crystal, Glass, and Stained Glass.

Meriden Flint Glass Works, West Meriden.

Honorable Mention.

Class 20.—Pottery.

Class 21.—Carpets, Tapestry, and other Stuffs for Furniture.

Class 22.—Paper Hangings.

Class 23.—Cutlery.

Northfield Knife Company, Northfield.

Bronze Medal.

Class 24.—Goldsmiths' and Silversmiths' Work.

Class 25.—Bronzes and various Art Castings, and Repoussé Work. Russell & Erwin Manufact'ng Co., New Britain.

Bronze Medal.

Class 26.—Clocks and Watches.

Ansonia Clock Co., Ansonia.

Bronze Medal.

Thomas (Seth) Clock Co., Thomaston.

Silver Medal.

Class 27.—Apparatus and Processes for Heating and Lighting.

Class 29.—Leather Work, Fancy Articles, and Basket Work.

FOURTH GROUP.—TEXTILE FABRICS, CLOTHING, AND ACCESSORIES.

Class 30.—Cotton Thread and Fabrics.

Manville Company, Manville. *Silver Medal.*

Slater, John G., Jewett City. *Bronze Medal.*

Willimantic Linen Co., Hartford. *Silver Medal.*

Class 31.—Thread and Fabrics of Flax, Hemp, &c.

Class 32.—Worsted Yarn and Fabrics.

Class 33.—Woolen Yarn and Fabrics.

Class 34.—Silk and Silk Fabrics.

Class 35.—Shawls.

Class 36.—Lace, Net, Embroidery, and Trimmings.

Class 37.—Hosiery and Underclothing and Accessories of Clothing.

Waterbury Button Company, Waterbury.

Honorable Mention.

Wheeler & Wilson Manufac'ng Co., Bridgeport.

Bronze Medal.

Class 38.—Clothing of both Sexes.

Class 39.—Jewelry and Precious Stones.

Class 40.—Portable Weapons and Hunting and Shooting Equipments.

Colt's Patent Fire Arms Company, Hartford.

Bronze Medal.

Sharp's Rifle Company, Bridgeport.

Silver Medal.

Class 41.—Traveling Apparatus and Camp Equipage.

Class 42.—Toys.

Stevens, The J. E., Company, Cromwell.

FIFTH GROUP.—MINING INDUSTRIES, RAW AND MANUFACTURED PRODUCTS.

Class 43.—Mining and Metallurgy.

Bailey, Leonard & Co., Hartford. (See Cl. 59.)

Barnum Richardson Company, Lime Rock.

Gold Medal.

Bevin Brothers' Mfg. Co., East Hampton.

Silver Medal.

Collins & Company, Hartford.

Gold Medal.

Class 43.—Mining and Metallurgy.

McCurdy (C. J.), Lyme. *Honorable Mention.*

Mallory, Wheeler & Co., New Haven.

Gold Medal.

Manning, Bowman & Co., West Meriden.

Mower (E.), Roxbury Station.

Honorable Mention.

New England Granite Works, Hartford.

Bronze Medal.

Peters' Combination Lock Co., Waterbury.

Honorable Mention.

Redpath, F. W., Stony Creek.

Honorable Mention.

Russell & Erwin Mfg. Company, New Britain.

Gold Medal.

Seward, M. & Son, New Haven. (See Class 62.)

Smith & Egge Mfg. Co., Bridgeport.

Bronze Medal.

Yale Lock Company, Stamford. *Silver Medal.*

Class 44.—Products of the Cultivation of Forests and of the Trades appertaining thereto.

Wheeler & Wilson Mfg. Company, Bridgeport.

Class 45.—Products of Hunting, Shooting, Fishing, and Spontaneous Products—Machines and Instruments connected therewith.

Class 46.—Agricultural Products not used for Food.

Connecticut Board of Agriculture, by P. M.

Augur, Secretary, Middlefield.

Class 47.—Chemical and Pharmaceutical Products.

Day, Austin G. (See Class 65 also.)

Class 48.—Chemical Processes for Bleaching, Dyeing, Printing, and Dressing.

Class 49.—Leather and Skins.

Jewell (P.) & Sons, Hartford. (See also Cl. 54.)

Underwood Belting Company, Tolland. (See also Cl. 54.)

SIXTH GROUP.—APPARATUS AND PROCESSES USED IN THE MECHANICAL INDUSTRIES.

Class 50.—Apparatus and Processes of the Art of Mining and Metallurgy.

Blake Crusher Co., New Haven. (See Cl. 55.)

Class 51.—Agricultural Implements and Processes used in the Cultivation of Fields and Forests.

Class 52.—Apparatus and Processes used in Agricultural Works, and in Works for the Preparation of Food.

Class 53.—Apparatus used in Chemistry, Pharmacy, and Tanning.

Class 54.—Machines and Apparatus in general.

Baxter Portable Steam Engines, F. J. Fales, Agt.

Brooks, Ezra, Hartford. *Bronze Medal.*

Douglas, W. & B., Middletown.

Bronze Medal.

Jewell (P.) & Sons, Hartford.

Pickering (T. R.) & Co., Portland.

Bronze Medal.

Richards, Chas. R., Hartford.

Silver Medal.

Underwood Belting Company, Tolland.

Bronze Medal.

Wheeler & Wilson Mfg. Co., Bridgeport.

Class 55.—Machine Tools.

Blake Crusher Company, New Haven.

Silver Medal.

Stevens Patent Vise Co.

Bronze Medal.

Victor Sewing Machine Co., Middletown.

Bronze Medal.

Whitton (D. E.), West Stafford.

Class 56.—Apparatus and Processes used in Spinning and Rope-making.

Class 57.—Apparatus and Processes used in Weaving.

Class 58.—Apparatus and Processes for Sewing and Making up Clothing.

Wheeler & Wilson Mfg. Co., Bridgeport.

Grand Prize.

Class 59.—Apparatus and Processes used in the Manufacture of Furniture and Objects for Dwellings.

Bailey, Leonard & Co., Hartford.

Bronze Medal.

Russell & Erwin Manufacturing Co., New Britain.

Honorable Mention.

Stanley Rule and Level Company, New Britain.

Bronze Medal.

Rogers (C. B.) & Co., Norwich and New York.

Honorable Mention.

Class 60.—Apparatus and Processes used in Paper-making, Dyeing, and Printing.

Page (W. H.), Norwich. *Honorable Mention.*

Class 61.—Machines, Instruments, and Processes used in Various Works.

Wheeler & Wilson Mfg. Company, Bridgeport.

Class 62.—Carriages and Wheelwrights' Works.

Seward (M.) & Sons, New Haven.

Bronze Medal.

New Haven Wheel Company, New Haven.

Silver Medal.

Class 63.—Harness and Saddlery.

Class 64.—Railway Apparatus.

Barnum Richardson Company, Lime Rock.

Bronze Medal. (See also Cl. 43.)

Class 65.—Telegraphic Apparatus and Processes.

A. G. Day (Kerite), Seymour.

Honorable Mention.

Class 66.—Apparatus and Processes of Civil Engineering, Public Works, and Architecture.

New England Granite Company, Hartford.

Bronze Medal.

Russell & Erwin Mfg. Co., New Britain.

Gold Medal.

Yale Lock Co., Stamford.

Gold Medal.

Class 67.—Navigation and Life Saving.

Class 68.—Materials and Apparatus for Military Purposes.

Gatling Gun Company, Hartford. *Silver Medal.*

Hotchkiss, B. B. (Paris and Connecticut).

Gold Medal.

Class 68.—Materials and Apparatus for Military Purposes.

Pratt, Whitney & Co., Hartford. *Gold Medal.*Sharpe's Rifle Co., Bridgeport. *Silver Medal.*

Union Metallic Cartridge Company, Bridgeport.

Silver Medal.

SEVENTH GROUP.—ALIMENTARY PRODUCTS.

Class 69.—Cereals, Farinaceous Products, and Products derived from them.

Augur, P. M., Middlefield.

Bradley, G. W., Hamden. *Honorable Mention.*Clarke, E. B., Middlefield. *Bronze Medal.*

Connecticut Board of Agriculture, Hartford.

Gold, T. S., West Cornwall.

Honorable Mention.

Class 70.—Bread and Pastry.

Class 71.—Fatty Substances used as Food—Milk and Eggs.

Class 72.—Meat and Fish.

Class 73.—Vegetables and Fruits.

Class 74.—Condiments and Stimulants, Sugar and Confectionery.

Class 75.—Fermented Drinks.

EIGHTH GROUP.—AGRICULTURE AND PISCICULTURE.

Class 76.—Specimens of Farm Buildings and Agricultural Works.

Class 77.—Horses, Donkeys, Mules, &c.

Class 78.—Oxen, Buffaloes, &c.

Class 79.—Sheep, Goats.

Class 80.—Pigs, Rabbits, &c.

Class 81.—Poultry.

Class 82.—Dogs.

Class 83.—Useful Insects and Noxious Insects.

Class 84.—Fish, Crustacea, and Mollusca.

NINTH GROUP.—HORTICULTURE.

Class 85.—Conservatories and Horticultural Apparatus.

Douglas, W. & B., Middletown. *Silver Medal.*

Class 86.—Flowers and Ornamental Plants.

Class 87.—Vegetables.

Class 88.—Fruit and Fruit Trees.

Class 89.—Seeds and Saplings of Forest Trees.

Class 90.—Plants for Conservatories.

SUMMARY OF AWARDS TO CONNECTICUT EXHIBITORS.

Grand Prize,	.	.	.	.	.	.	.	1
Gold Medals,	.	.	.	.	.	.	.	9
Silver Medals,	.	.	.	.	.	.	.	13
Bronze Medals,	.	.	.	.	.	.	.	25
Honorable Mention,	.	.	.	.	.	.	.	14
								<hr/>
Total number of awards,	.	.	.	.	.	.	.	62

THE INFLUENCE OF EXHIBITIONS AND MUSEUMS.

We may advantageously consider for a moment the important influence exerted by such an exhibition as that of Paris in 1878 upon the industries of the State.

There were over thirteen millions of admissions to the Exhibition of 1878. In 1867 there were nearly nine millions, and at Philadelphia, in 1876, nearly ten. The world evidently does not tire of such exhibitions. They are too valuable in their results and too attractive to be given up. Their educating power can scarcely be over-estimated. They are appropriate to the age of steam, of steel, and electricity. Their influence extends beyond the comparatively few who have the privilege of visiting and studying them. The press diffuses the information harvested by its agents and by the commissioners of all countries. The reports upon the industries and products generally present a summarized view of the world's progress with details of all notable improvements and discoveries.

The impression left by the Exposition in comparison with our exhibition, the Centennial in 1876, is that it was much more compact and full. The grounds lacked the breadth and picturesque effects of Fairmount Park, and of necessity the buildings were nearer together and were more compactly filled.

The French section, particularly, was very closely filled; space was economized everywhere. The high finish and artistic forms and designs characterizing these exhibits, and the preponderance of the art element in French and other foreign industries, was a notable and striking feature, especially as compared with our more utilitarian products. We can see that in France, and other countries, the arts of decoration are grafted upon and adorn the essential industries. It is not sufficient there to make an article that will merely serve its purpose; it must be beautified and adorned.

IMPORTANCE OF ART MUSEUMS AND OF INSTRUCTION IN ART.

Art culture is more fully recognized abroad than in the United State as essential to industrial progress. Without it in the keen competition for success nations are left behind in the race. Exhibitions have done much to arouse public sentiment to its importance, and have stimulated art schools and museums to increased effort and a broader usefulness. The exhibition afforded the very best opportunity of noting the effects in different countries of systematic art training and of museums, upon producers and consumers. It need hardly be said where these effects were most manifest, we had but to walk through the British section to feel that the national efforts have not been made in vain. We could see on all sides the fruit of the seeds so abundantly sown and nurtured since the exhibition of 1851—that notable starting point in the history of industrial and artistic advancement. And we could note, also, that this great advancement is not confined to a favored few, to the artists alone, but it is evident that the capacity of appreciation by the people has been raised at the same time. This has been accomplished in great part by the exhibitions and by the industrial art museums founded and sustained by liberal appropriations of money by the government and supplemented by art schools and lectures and publications.

With such results it is evident that art schools and museums of artistic and decorative manufactures are a good investment for any community. They are in themselves great centers of attraction, and valuable as such aside from their more extended and important educational effects. What is it that constitutes the great attraction of the city of London to an intelligent stranger? Does it not consist chiefly in the unrivalled museums, galleries of art and institutions? There is no branch of industry, science or art that may not be freely and advantageously investigated in London through the facilities provided by the state and open to all. We name in illustration, the British Museum and Library, the South Kensington Museum, the Museum of Economic Geology, the National Gallery, and Royal Botanic Gardens and Museums at Kew.

SOUTH KENSINGTON MUSEUM.

If we ask in regard to the influence exerted by museums we have only to consider that at the South Kensington alone, the average number of visitors is about 2,500 daily. Since June, 1857, there have been over seventeen millions of visitors who have been permitted to familiarize themselves by close inspection with the choicest productions, of human skill in working clay, stone, the metals, wood, ivory, and all the workable materials. The collections, which were at first but small, filling one or two rooms, have been enormously extended, and are now surprisingly rich and varied. It is not strange that the potters of Staffordshire should so far surpass their former work, if indeed they do not lead the world in potting, when they have such magnificent collections of the best productions of the fabriques of China, Japan, India and Persia constantly before them. No wonder that at Worcester they have achieved such a mastery over the spirit of Japanese art, when the story of its development is constantly told in case after case filled with choice examples of pottery and porcelain of all kinds and all styles of decoration. To perfect this collection the Museum, not content with its own ability to procure, called the Japanese government to its aid, and by the coöperation of that government has now the most complete suite of Japanese ceramic products in existence.

In examples of Persian art also the collection is enormous, and is surprisingly rich and beautiful. It is very attractive to industrial artists, and cannot fail to find appreciation and profitable reproduction. So, also, the greatly extended collection of examples of Della Robbia's work in enamelled terra cotta, some of them life-size figures, is full of instruction and suggestion to our potters and architects.

REPRODUCTIONS OF ANCIENT GLASS.

We can scarcely say how much we are indebted to museum collections for the advancement of the arts. Artizans, artists, and the public absorb information without knowing it. They gather inspiration and new ideas by contact with the masterpieces of others. A fragment of ancient Roman glass pre-

served in the British Museum has with Castellani's aid led to the recovery of the long lost process of manufacture. It is to this museum and to those of Rome and Venice, with the private collections of Castellani and his personal efforts with the glass blowers at the furnaces in Venice, we are indebted for the very interesting reproductions of early Christian and Murano glass which constituted one of the chief attractive novelties of the exhibition in the Italian section. Thus museums preserve and revive art. The Portland vase in the British Museum is another example. Copies equally beautiful are now made at the glass works of Webb, Stourbridge, England, and were exhibited in the British section.

CASTELLANI'S COLLECTION.

It is in this way that really meritorious and comparatively rare objects of manufacture become of immense value and are eagerly sought by museums. Castellani's lustred majolica vases and plaques, which we could have had in the United States if we had fairly appreciated them, were sold in Paris at auction for nearly twice the amount he asked us to pay for them. The specimens were eagerly bought by museums and private collectors. The art potteries of Italy, of Europe and of the British islands, may be congratulated on the acquisition of these treasures by continental collectors. More than one influential British potter has been heard to say that it is well for them that America did not secure the collection. Its possession would have instructed and stimulated our potters to a dangerous rivalry. The first two days of the sale brought in over 400,000 francs. The competition for the choice pieces was spirited. Two plates alone, the Charles V. and the tortoise shell brought 45,000 francs, one of Gubbio's fine lustred plates 10,000 francs. Castellani is happy in being vindicated from any suspicion of trying to drive a sharp bargain with the Metropolitan Museum in New York.

BETHNAL GREEN.

It must not be supposed that the South Kensington is the only example of an influential museum of the kind in Britain. It distributes its blessings all over the kingdom by sending

out selections of its choicest objects. Even Sèvres vases, lent by the Queen, are allowed to adorn the local exhibitions in such places as Birmingham and Manchester. In London also a large and flourishing branch museum is in operation at Bethnal Green, where there is a special loan exhibition of furniture, cabinet work and ornamental wood work. It is enriched by numerous examples from the collections of the Queen and the leading families of England. It is in a part of the city where there are many manufacturers of furniture and artisans devoted to working in wood. The museum contains in addition a large collection of paintings, pottery, armor and other works of art.

MUSEUMS AT YORK AND MANCHESTER.

In addition to the well known geological museum of the Philosophical society at York there is now a very important collection of Roman antiquities exhumed for the most part from a Roman cemetery when excavations were made for the new railway station. But not content with these treasures, already well housed, the foundations are laid for a splendid museum building adjoining the ruins of the old monastery.

In Manchester an attractive loan exhibition was opened in May in aid of the Manchester School of Art, which requires a new building at an expense of some \$175,000. Sir Henry Cole (lately honored in London by a substantial testimonial), and Lord Derby are among the chief promoters of this undertaking.

At Nottingham the Castle is devoted to an Industrial and Art Museum and the Prince and Princess of Wales presided at the opening in July.

ART NEEDLE-WORK.

The Royal School of Art Needle-work is increasing the sphere of its operations under the patronage of the Princess Christian, and a committee of ladies. An exhibition of ancient needle-work has been in successful progress at the school in South Kensington. The collection sent by this school to Philadelphia in 1876 will be generally remembered. It also sent a

variety of embroideries to the Paris exhibition, including the borders of the curtains which adorn the pavilion of the Prince of Wales.

FANMAKERS' EXHIBITION.

The Fanmakers' Company of London held a competitive exhibition, opened on the 19th of June by the Princess Louise. The competition was open to manufacturers, amateurs, collectors and dealers. Five classes of fans were admitted, and prizes of gold, silver and bronze medals, and money prizes also, were awarded.

TECHNICAL EDUCATION.

The famous guilds of London are awaking to a realization of the importance of facilities for special education of craftsmen in their respective spheres. Twelve livery companies, including the mercers, drapers, fishmongers, goldsmiths and cloth-workers, have united in appointing a general committee to draw up a plan of operations, and have pledged contributions to the extent of \$60,000 annually, and it is expected that at least \$100,000 will be made up for the beginning of an experiment. So far, it seems to have been agreed that a technical university is required for "the improvement of the technical knowledge of those engaged in the manufactures in the country," whether employed as workmen, managers or foremen, or as principals. The training will be such as to impart a knowledge of the scientific or artistic principles upon which a particular manufacture may depend. The committee recommend that the course of studies shall comprise applied physics, applied chemistry, and applied mechanics, and a department of applied art, each branch being in charge of a professor, with assistants.

EUROPEAN MUSEUMS.

A notice of the increased efforts making on the continent would require considerable space. There is great activity in Vienna, Berlin, Hungary and Japan. Besides the expenditure necessary to restore the Tuileries, appropriations were made to considerable amounts for securing at the Exposition objects appropriate to the various collections in Paris, notably those of

the École Centrale. Several appropriations were also made to specially appointed commissions of experts to study and report upon several departments of the exhibition. It was evident that the nation did not intend to let the opportunity pass unimproved. The Prince of Wales also addressed the mayors of the chief cities of England urging that deputations of workmen be sent to Paris, to study the exhibition. The agents of foreign museums all over Europe, and even in Japan, were at the exhibition buying up the best objects of art work to take home to their public collections. The art museum at Buda Pesth, Hungary, was one of the most active in this direction.

OPENING OF THE PARIS MUSEUM OF DECORATIVE ART.

In the month of August the new museum was opened with appropriate ceremonies at the Pavilion de Flore, Tuileries. It is to be known as the "Museum of Decorative Arts," and is under the presidency of the Marquis de Chennevières and M. Edourd André, president of the Central Union of the Fine Arts applied to Industry. The Honorary Presidents (and important members of administration) are: Cunliffe Owen, C. B., director of the South Kensington Museum and secretary general to the British commission, and Sir Richard Wallace, Baronet, M. P.

The object of this new undertaking, even under the shadow of the great Louvre Museum, is confessedly to aid France to keep pace with England, Austria, Belgium and America in the employment of every possible means for the development and progress of art-industry. The supremacy which France has so long enjoyed in all the industries where art is applicable is not only threatened with competition on all sides, but in many respects does not now exist. The result of England's great national efforts is convincingly shown to all who visit the exhibition. Progress in art and its applications characterizes the British display. An editorial notice in the *Messenger* at the time tells the story which we too must learn and act upon. "It has, therefore, been deemed necessary to create an institution similar to the South Kensington Museum in London, and to initiate the liberal principles that have guided its direction, not

only in the collection of models of architecture, sculpture, paintings, drawings, fixed and movable decorations, furniture, mosaics, ceramics, glass, clothing, jewelry, arms, scholastic instruments, books, etc., useful for the instruction of artisans and others engaged in the study and manufacture of articles of art-industry, but also in adopting the English system of sending the chefs-d'œuvre of the museum into the provinces, by arranging and encouraging numerous and frequent exhibitions throughout the country. The opening of this new institution was limited yesterday to five or six picture galleries, exhibiting numerous admirable works of the old and modern schools, belonging to friends of the undertaking. The exhibition is supported by voluntary contribution. The first list of subscription shows a total of 132,350fr. The French government has given a liberal encouragement by placing the splendid Pavillon de Flore, at the Tuileries, at the disposal of the association." The managers of this museum made many important acquisitions at the Exhibition, and gave an order to Tiffany & Co., of New York, for a complete suite of reproductions of jewelry from the collections of Dr. Schlieman now in the Metropolitan Museum, New York.

SELECTIONS FOR OTHER MUSEUMS.

Towards the close of the season at the exhibition the agents of many of the continental museums were active in obtaining some of the choicest objects for their collections. Among others Mr. Wagner, the accomplished secretary of the Pennsylvania Museum of Industrial Art, spent some time at the Exhibition, having been specially commissioned by the Governor of Pennsylvania to visit the museums of Europe and the Exhibition. He secured some of the desirable objects from the Elkington reproductions, and the beautiful forged iron work of Vienna. The new museum at Pesth also made many valuable selections.

HONOR TO HANDICRAFT.

It is our duty not only to establish museums and extend the knowledge of art, but to honor and encourage skilled handicraft. In these days of machine work and the decadence of

the apprentice system, it becomes of greater and even vital importance. The French workman loves his art and is honored by it. He is proud of his skill. French locks and bolts, for example, have the redeeming features of the impress of the taste and skill of the makers. They are not made merely to fasten doors and windows, but to decorate them at the same time. In the outside exhibition by the workingmen there were some good examples of forged iron candle-sticks and candelabra from the blacksmith shops of Paris. These smiths are proud of their work, and justly so. They are artists. The voice of Gladstone has just been heard at the annual flower show at Hawarden in favor of a higher and more general appreciation of handwork, and its elevation to the highest excellence of which it is capable. He directs attention to the fact that a great deal of what is generally regarded as the highest form of labor is performed with the hands. He urges ladies to give more attention to needle-work as a fine art, commending it as not only an improving process, but a gainful process, for although needle-work in its lower and common forms is the worst paid labor in the country, in its higher forms it is very well paid.

GLASS FOR THE CONNECTICUT MUSEUM.

By the liberality of the Meriden Britannia Company I was enabled to secure a small but instructive collection of glass ware illustrating the recent advances in the art of making decorative glass, for the Connecticut Museum of Industrial Art at New Haven where it is now deposited.

SPECIAL NOTICES OF THE EXHIBITS.

GROUP I.—WORKS OF ART.

OIL PAINTINGS.

In the classification, paintings and sculpture take precedence of other works of art, and of the products of industry.

The high reputation of the State in the annals of art development in the United States is well sustained by the picture sent by Professor John F. Weir, of the Yale Art School, known as "*Forging the Shaft.*" It is a canvas, about four feet by six feet, and represents in an accurate and vivid way the interior of a great iron establishment with a massive crane and a steam hammer, and a large iron shaft for a steamboat being drawn from a glowing furnace preparatory to its being forged under the heavy hammer. This shaft, one end of which has been brought to a white heat in the furnace, is slung in the loop of a heavy chain, and a dozen or more swarthy men are exerting their strength to move the mass of iron.

It is evidently a study from life. Visitors to West Point who have seen the Cold Spring Foundry may recognize in this picture a faithful study of the interior. Any observant iron metallurgist may see that such a representation of white-hot iron required other inspiration than the surroundings of an artist's studio. The incipient redness, the white heat, the dripping slag, the black scale, and the glow of light upon the beams and rafters all tell of a close study of the forge. It is an admirable picture. It was hung rather too high to be seen to the greatest advantage.

At the time of my inspection of this picture I had fortunately just returned from a visit to the great iron and steel works of the Schneider's at Creusot, the largest establishment of the kind in France, and ranking next in importance to

Krupp's gigantic works in Prussia. The visit was made in company with the Iron and Steel Institute of Great Britain, and in order to show the working of the great eighty-ton steam hammer a forty-ton steel ingot had been heated up and was forged under it. With the recollection of this glowing mass of steel fresh in my mind, I could write with confidence upon the merits of this particular picture of our gifted painter and could make a critical comparison of it with the only other picture that I knew of in the Exhibition with a similar subject. This other picture, a little larger than Wier's "Forging the Shaft," is from the easel of Adolphe Menzel, of Berlin, and was taken from the walls of the Imperial National Gallery there to receive a special place of honor in the Prussian Art Gallery. It is evidently a favorite picture.

It represents the interior of a rolling mill and the rolling of rails. The canvas is crowded with figures. There are too many men at work in a narrow space. In the foreground a hot ingot, looking like a bit of armor plate, has just been brought from the furnace to the grooved rolls. Beyond this a long red-hot rail is passing through the next train in most distressing proximity to the men grouped together by the artist. The hot ingot is too large. It lacks glow. The men are close upon it with comparatively delicate pincers, too light for handling such a mass of metal. The whole picture is too much crowded to be real. Such grouping of men and hot iron can hardly be possible in a rolling mill. The artist is less successful with his technics than with his figures. Weir succeeds with both. Menzel's figures are good; the muscles of the arms and hands are capitally well drawn and painted, but the composition is forced and unnatural. Groups of workmen in one place are washing for dinner, while another group is eating dinner and other workmen are busily at work at the rolls. No such incongruity is found in Weir's picture.

The catalogue of the pictures by American artists contains the titles of one hundred and twenty-seven oil-paintings by eighty seven different artists. There were, in addition, sixteen water colors and seven engravings.

GROUP II.

EDUCATION AND INSTRUCTION, APPARATUS
AND PROCESSES OF THE LIBERAL ARTS.

EDUCATION.

In this somewhat comprehensive group there were at least nine exhibitors from the State. Class 6, includes educational works, school books, etc. Here we find "The American Journal of Education," edited by Henry Barnard, LL.D., Hartford, in twenty-six large octavo volumes, from the year 1856 to 1877, inclusive, to which the jury awarded a Gold Medal.

The Connecticut State Department of Public Instruction was represented by twelve volumes of reports sent by the secretary, B. G. Northrop. These filled an appropriate space on the shelves in the complete set of reports from most of the States of the Union, collected together and arranged under the direction of Mr. Philbrick, of Boston, in charge of the Educational display. There was, also, a volume of the New Haven City School Reports from Ariel Parish, Superintendent.

The educational department was a center of attraction to educators of all countries, and was creditable to the country, though the space which could be spared for it was extremely limited. A special catalogue was issued containing statistical information concerning our educational institutions.

MARK TWAIN'S SCRAP-BOOK.

The patent scrap-book, for which we are indebted to the author by whose *nom de plume* it is known, is a valuable adjunct to the acquisition and preservation of knowledge. It is intended chiefly for the preservation of slips cut from newspapers, engravings, cards, etc., etc., and consists of a blank book with the pages already gummed in lines or squares, so that it is only necessary to moisten the slip and put it into place in order to attach and secure it permanently. It is made in a great variety of sizes and styles of binding, by Slote, Woodman & Co., of New York, the publishers, and was exhibited by them. Four or more invoices of this book were sold during the summer. It is especially useful to authors, editors and druggists, and is also used by children.

PAPER.

Case Brothers, of South Manchester, sent a superior description of press board for printers' use. These boards are also used by manufacturers of woollens.

PARKER'S TREASURY BLOTting PAPER.

Joseph Parker & Son, of New Haven, exhibited a variety of styles and grades of their superior "Treasury Blotting Paper." The manufacture of such paper is now an important industry. For this special brand of blotting paper the fibre is selected and the paper made with direct reference to its absorbent qualities, while all loose lint is avoided. Samples were freely distributed to the Commissioners and others, by the agents, Messrs. Woolworth & Graham, of New York, who had a collective exhibit of papers, made by twenty-eight different establishments.

WAVERLY MILLS, BURNSIDE.

The book-printing paper of these mills, also, was represented by Woolworth & Graham. They supplied the paper upon which the Official Catalogue of the United States Section was printed at the Chiswick Press, London.

STANLEY RULE AND LEVEL COMPANY.

Class fifteen includes not only physical apparatus, as generally understood, but try-squares, gauges, scales and carpenters' rules, and standard measures. The most important contributor in the United States section of this class of goods, is the Stanley Rule and Level Company of New Britain. This company sent over the same glass case that was exhibited by them at the Centennial, and about the same selection of rules, squares and carpenters' tools. The finish and accuracy of these goods are well known. These qualities combined with cheapness are causing a considerable foreign demand. The company is also doing good service in making the metric system better known in the United States and abroad. Their carpenters' tools were entered, also, in class 59, and received a Bronze Medal from the jury of that class.

GROUP III.—FURNITURE AND ACCESSORIES.

COLLENDER'S BILLIARD TABLES.

The peculiar classification takes us next in order to billiard tables. The only one here is from Collender's factory at Stamford, but it is entered as from New York. It is a small carom table finished in light wood. It received a Silver Medal and was sold before the close of the exhibition to an appreciative amateur.

MERIDEN FLINT GLASS WORKS.

The Meriden Flint Glass Works, West Meriden, which were started after the close of the Centennial exhibition, sent a small but good sample of their cut-glassware. It consisted chiefly of goblets and champagne glasses, with one or two trays all deeply cut in the geometrical style, in vogue a century ago and now so generally revived. The cutting is excellent and the form and "metal" good. Great credit is due to the enterprising founders of this important industry at Meriden. They already manufacture largely, and in addition to standard articles for household use, make a great variety of small objects suitable for mounting in silver or white metal by the Meriden Britannia company. Decorated lamp shades, which are shown here with the cut-glass, are also successfully made in large quantities. Although the company was averse to making any exhibition, and did not attempt a display commensurate with the present and expected magnitude of the works, the jury have decreed an honorable mention. This, under the circumstances, may be regarded as a high award. Great advances have been made at the works during the progress of the exhibition and the "metal" is now much whiter and more brilliant than it then was.

At no previous exhibition has there been such an extensive and varied display of glass of all kinds and from many countries. The French and Austrian displays were particularly brilliant. England had also many exhibitors of blown and colored glass as well as costly cut and engraved glass. We there find copies of the Portland vase which have required the patient labor of the artist for years in sculpturing the outer layer of opal glass, producing all the effects of the finest stone cameos upon the inner or blue glass body of the vase.

By the liberality of the Meriden company, I was enabled to purchase about two hundred dollars worth of typical examples of glassware of various countries and makers to add to the collection of glass in the Connecticut Museum of Industrial Art, for the instruction of the workers in glass at the Meriden works and the public.

NORTHFIELD KNIFE COMPANY.

The case of cutlery sent by this company was nearly the same as they exhibited at the Centennial. It contained over eight hundred styles of pocket cutlery, each piece differing from the other in form, material and style of finish. They all show thorough work and good materials. The finish of the blades is excellent, and the forms are good. The handles are well attached and finished. The jury awarded a Bronze Medal.

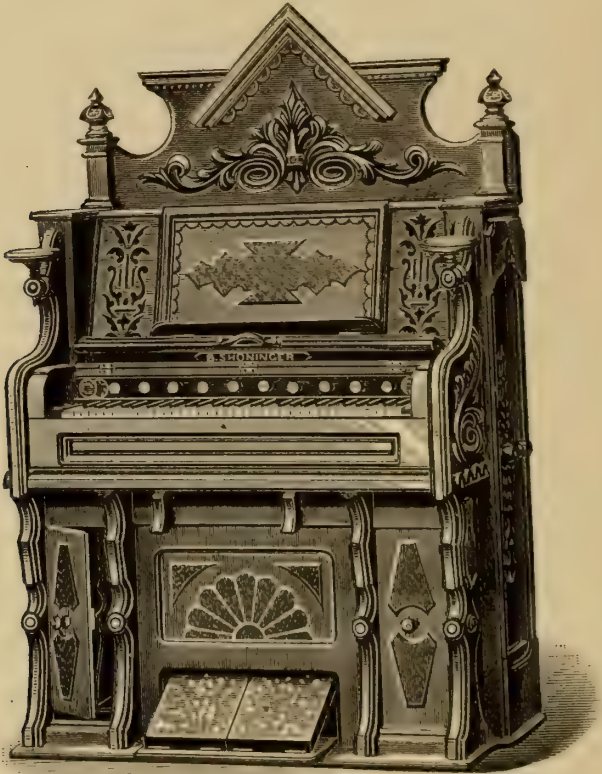
B. SHONINGER ORGAN COMPANY.

In Class 13, "Musical Instruments," the B. Shoninger Organ Company, of New Haven, was the only exhibitor from the State. The exhibit was in every respect creditable to the industry of organs and pianos.

This firm, established in New Haven in the year 1850, has assumed considerable importance as a large manufacturer of organs and recently of pianos. It was fully represented at Paris by organs of three or four different styles and by pianos of the cottage or upright pattern. Of organs there are some thirty or more different patterns made, ranging in cost from \$100 to \$600, and over. More than fifty thousand of these instruments have been sold in the past twenty-eight years. These are all known as "reed" instruments in distinction from the "pipe" organs which are much more cumbrous and costly. The reporters upon musical instruments at the Centennial observe as follows regarding reed instruments or parlor organs.

"They belong to a class of comparatively recent invention, which, growing rapidly into favor, because supplying a want not met by any other instrument of this variety, have assumed a positive commercial importance, and summoned great inventive talent and skill in their manufacture and progressive improvement.

“Their tones are produced by the passing of air through free reeds, brass tongues being fixed at one end and left free to vibrate at the other on impulse of air, and so yielding musical tones. Their peculiar characteristics are volume, compass, delicacy, and sustained expression, with ease of producing increase or diminution of utterance. The wind is supplied by arrangements controlled by the player, or, as in the larger ones, for vestries or small churches, by an assistant at the rear or side.



Universal Cymbella Organ.

“The importance to which the manufacture of reed-organs has attained in the United States is attested by the fact that there are about fifty thousand such instruments made yearly in this country by about two hundred and fifty manufacturers. Under the general name of reed-organ are included all instru-

ments played upon by keys like those of the piano-forte, and yielding their tones by the vibration of their reeds."

The firm of B. Shoninger & Co., by concentrating its attention upon this manufacture, by carefully studying its requirements and providing every facility, has carried the parlor-organ to great perfection, so that it compares and competes with pipe organs for home use, for Sunday schools and for churches. The simple "*melodeon*" or "harmonium" of a few years ago has been replaced by these instruments. The melodeon was the first reed instrument, but it had only one set of reeds and no stops. Now, the Shoninger organs are made with four sets of reeds besides sub-bass and octave couplers, permitting a power equal to ten sets of reeds. There are also accessories which greatly extend the capacity of the instruments. Thus the "Universal Cymbella Organ," one of the finest instruments shown at Paris, has five octaves, four sets of reeds, one set powerful sub-bass, chime of bells, octave couplers, fourteen stops, melodia, cymbella, full organ dulciana-triple, flute, piccolo, dulciana-bass, vox humana, viola, forte, celeste and trombonet attachments. The case is elaborately made and finished. It is so constructed with a "trumpet throat" that it gives freedom to the sound, increases its power, and qualifies the tone, producing the effects of a pipe-organ, from which it can scarcely be distinguished. It is the aim of the manufacturers to give all the important and desirable qualities possible in a reed-organ by using the very best materials, employing skilled labor, availing of every improvement and exercising the greatest care and ingenuity.

Much attention has been given to the form and construction of the case, so as to give freedom to the sound and to ensure softness without loss of power. The sounding boards of the instruments at Paris, and as usually made by the manufacturers, were formed of three sheets of wood with the grain running in opposite directions, and firmly united by glue so as to form one solid sheet. This construction prevents splitting or cracking. The same material is used for the wind chest, preventing all loss of air by leakage through the wood. Special provisions are made to prevent the entrance of mice, which frequently destroy organs. The vacant spaces of the case are utilized so as to give dust-proof receptacles for music books.

The pianos also contained some novelties of construction. The sounding board was attached to and made a part of the case. The use of metal in the action was avoided so as to prevent any disagreeable metallic sounds. The piano was in use for a great part of the time during the summer. Its tone was sweet but powerful, and it always drew a crowd of delighted listeners.

The jury awarded a Silver Medal. The judges at the Centennial Philadelphia Exhibition, 1876, commended these reed-organs for award "because the company manufactures good instruments at a price rendering them possible to a large class of purchasers, the instruments having a combination of reeds and bells producing novel and pleasing effects."

ART CASTINGS.

Under Class 25, "Bronzes, Various Art Castings and Repoussé Work," the Russell & Erwin Manufacturing Company claimed a place for their door and window fittings, in bronze and enamel. For sharpness and beauty of line and detail, with smoothness and almost polished finish of surface their sand castings of bronze are probably unequalled. These castings were exhibited in plain bronze, as taken from the sand, and in several other styles of finish. Some are nickeled, some richly gilt, and some enameled. They consist chiefly of finger and key plates and knobs. The enameled pieces are good specimens of *champlevé* work, and show a decided mastery of the art.

The bulk of the exhibit by this firm was classed as General Hardware in Class 43, and is more fully noticed under that head. Their show-case—or the installation, in exhibition parlance—was an exceptionally good one, and was well located.

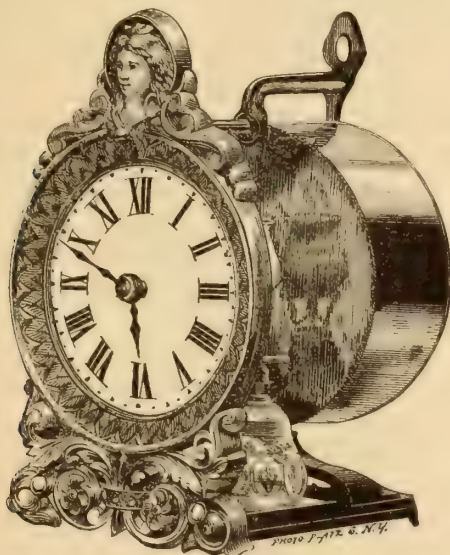
SETH THOMAS CLOCK COMPANY.

There were two exhibits of clocks from Connecticut, one from the Seth Thomas Clock Company, and the other from the Ansonia Clock Company. The Thomas exhibit was well placed upon one of the main avenues opposite Marcotte's richly furnished alcove. The large church or town-hall clock, with its ponderous pendulum, was the prominent object in the midst of an array of familiar clock-faces. On the other side there was

a great variety of "movements," without cases or dials, on a velvet back-ground behind plate glass. These movements were finished in various ways, nickel plated, silvered and gilt, and, being in motion, formed an attractive display. It is pleasing to note that the manufacture by this old established house is not confined to the cheapest and most ordinary clocks. Some of the eight-day, long pendulum, office clocks are highly finished pieces of mechanism, and are no doubt furnished at moderate prices. The agent lived in Hamburg, and this made it a little inconvenient for the average visitor, whose interest happened to be excited, to get the information about the clocks when he wanted it. Thousands of these clocks could have been sold, said an agent of another exhibitor, if there had been some one in attendance.

ANSONIA CLOCK COMPANY.

The Ansonia company had a case about ten feet by four, in which it exhibited a variety of clocks in fancy mountings.



Night Lamp Clock.

The cases were elaborately worked and decked with gilding and brass. In some, the circular wooden cases were replaced by spun metal, nickeled. There were a few tolerably neat

portable clocks with beveled plate glass cases in nickeled frames with handles at the top. A night-lamp clock, so arranged as to illuminate the dial and show the time, is simple and ingenious, and will no doubt have a large sale. The dial, which is made of opal glass or of porcelain, is advanced far enough beyond the wheel-work to allow of placing a small lamp or a gas-jet inside. The arbor carrying the hands is elongated sufficiently to traverse the space. This, it will be seen, adds very little to the cost of the clock, and no modification of the movement is required.

FOREIGN CLOCKS.

It may be advantageous to note some of the peculiarities of foreign clocks in comparison with ours. The French display was very extensive. There was one pyramid of brass clock movements, four yards high and four yards square at the base. There was a great variety in the forms and styles of clocks. The industry appeared to be much divided. Some establishments make the dials, others the hands, the wheels, or the cases. There was a great variety in the mountings, but in general they were more tasteful than ours.

There is manifestly great need of improvement amongst our clock manufacturers as respects the style and ornamentation of clock cases. It is time that the flimsy, veneered pine cases, in gothic and other fantastic shapes, with tawdry painted glass fronts should give way to something less odious. We have much to learn in this direction, and the Exposition was a good place in which to take a few lessons.

The most fascinating and satisfactory clock dials and clock cases were to be seen at the stand of Howell, James & Co., in the British Section. They produce a variety of styles of early English and Queen Anne clocks, designed for them by eminent art authorities, and adapted to dining or drawing rooms, libraries or halls. The cases are made in ebonized or other woods, black and gold, satin-wood, walnut, oak, or mahogany, and are inlaid with art pottery, with silver, brass, or marble panels, or with decorated tiles. The dials also are of porcelain, and are hand-painted, generally by amateurs, either with original designs or from those supplied by eminent authorities—by

Walter Crane or others. These clocks are made to harmonize with the prevailing domestic decoration in early English and Queen Anne styles. They are especially well adapted for presents, inasmuch as panels with monograms, crests, inscriptions, or devices suited to any occasion can be introduced with comparatively little expense.

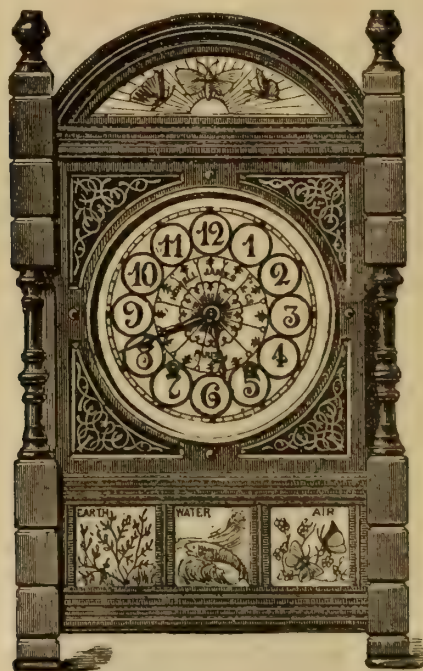
The clocks of this description shown at Paris were decorated with small hand-painted tiles, chiefly the work of female amateurs. The firm of Howell, James & Co., of London, has greatly aided and encouraged this class of work, by giving it a market through their salesroom on Regent street. These clocks appear to be very popular. They are for the greater part in ebonized wood, with turned corner posts, beaded, and sometimes incised and gilt. There is usually a small balustrade at the top, giving a shelf-like space for some object of art-pottery. Some are in the form of wall or corner bracket-shelves, or cases, with the clock in the center and a space above, under a roof-like covering for one or more vases. Such hanging wall clocks are from 36 to 50 inches long, 10 to 12 inches wide, and from 5 inches to 7 inches deep. The tiles and the



Early English Style—Design No. xvi.

dials are generally executed in blue on a white ground, and represent conventionalized flowers, the seasons, or the signs of the zodiac. Some of the movements run for sixteen days, and strike the hours and half-hours. They are all objects of luxury,

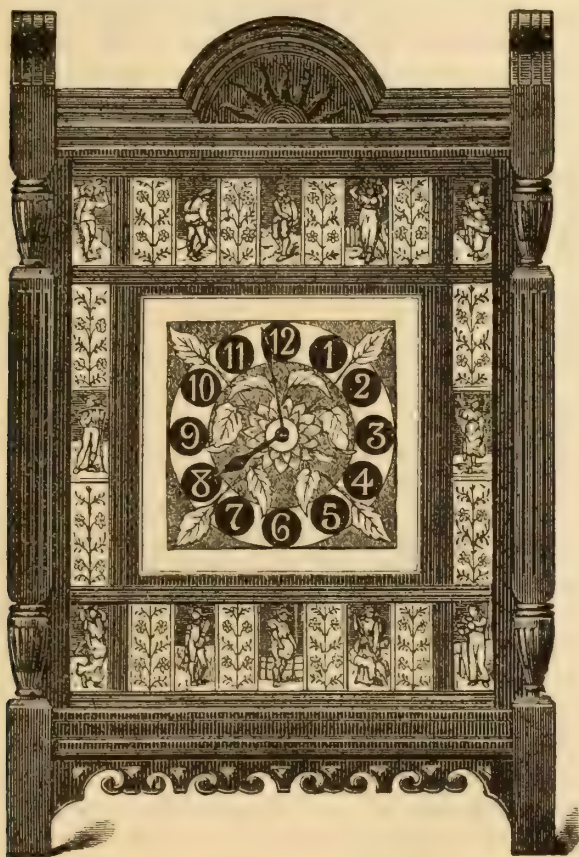
and the price is somewhat high. The 16-day movement in the early English style is sold at eight guineas. The design of this clock (Design No. xvi) is prefixed. The wood is incised and gilt. Another style of the same period is shown in the wood cut, Design No. xvii. This early English drawing-room clock has a blue and white china dial and pierced brass corners, turned posts and arched top. The designs upon the three tiles represent the "Elements,"—earth, water and air. It stands 17 inches high, $10\frac{1}{2}$ inches wide, and 7 inches deep.



Early English Clock—Design No. xvii.

Another, and more elaborately decorated front, is 22 inches high, 14 inches wide, and 7 inches deep, with panels painted in blue, representing the twelve months. These and the other tiles, and the dial, were designed by Walter Crane, and the case by L. F. Day.

All of these, and some thirty more designs, are specially registered in England, to preserve the property in them to the house of Howell, James & Co.



Queen Anne Clock.—*Designed by Day; Panels by Walter Crane.*

WILLIMANTIC LINEN COMPANY.

Under the head of Textile Fabrics, Cotton Thread, &c., Class 33, we find the exhibit of spool cotton in a great variety of colors and degrees of fineness, sent by the Willimantic Linen Company, of Willimantic and Hartford.

Either the climate of New England has changed, or British opinion of it must be modified, for here we have thread rivaling in fineness, evenness, and finish the world-renowned thread

of the British Isles, notwithstanding the belief that our climate would not permit of its manufacture. Some of our good forefathers in old England who had factories and wanted new markets were disposed to prohibit the establishment of competing industries in the colonies. Some of the royal edicts on broadside sheets sent out to be posted on the barns and shops of the Massachusetts Bay colony, and William Penn's farms, tell the whole story, and would be instructive reading. What could not be kept back by prohibition, they sought to destroy by defamation, and as respects the thread industry in America, in order to completely exterminate it and forever prevent the growth of the manufacture in America, our climate was declared to be such that its manufacture would be impossible. But we have not only made the thread, but have had the boldness to show it here to all the world, and to bear off a prize award for superiority.

The thread commands appreciation. By common consent the sewing machine representatives would not take any other thread for the trials upon their respective sewing machines. They insisted upon having the Willimantic as a standard thread, and the best adapted to their use. All of the available duplicate specimens in the exhibit were handed over to them. The recorded judgment at the Centennial, where the company was also an exhibitor, was: "Spool Cotton, Fine Yarns, and machines for winding and ticketing spools for sewing-threads," "commended for originality and completeness of system, excellence of machinery and appliances, the winding frame being the invention of Hezekiah Conant, and for superiority and economy of production, also for excellence of material and variety of colors of threads." With this recorded opinion of the Centennial judges before them, the jurors at Paris in 1878 were the better able to form a correct judgment, and they gave a Silver Medal.

COTTON PIECE GOODS.

In the line of cotton goods and cambrics, Connecticut has an honored place in the large collective exhibit made by Lewis Brothers & Co., who are agents for most of the New England mills. The Manville company have a large assortment of col-

ored cambric linings in rolls at one end of the case. Fine cambric muslin is shown in the piece, both unbleached and bleached, by the Ponemah mills, Taftville, and the mills of John F. Slater, of Norwich, are represented by a full line of fancy striped cheviot shirtings.

EMBROIDERY AND SEWING MACHINE WORK.

Under Class 36 we had one entry from Connecticut—the Wheeler & Wilson Manufacturing company, Bridgeport, who displayed a variety of specimens of sewing machine work, embroidery, etc., by Mrs. Winn, and received a Bronze Medal from the jury of Class 37. This award is distinct from those given in other classes and is a special recognition of the excellence of the work accomplished by the aid of the Wheeler & Wilson machines. This work includes all grades of sewing, from the coarsest and strongest on heavy goods for men's wear, on thick woolens, on canvas and leather down to the softest and finest fabrics of satin, silk and cambric muslin. Specimens of leather belting and boot soles are contrasted with gossamer shirts for babes and embroidery on satin, all showing precision of work throughout this wide range of application. One little shirt of the finest fabric is stitched with No. 400 Willimantic cotton scarcely heavier than a spider's web and as fine as the thread of the tissue itself, yet under a microscope the stitches are seen to be even and regular. An embroidered white satin mouchoir case shows the capacity of the ordinary machine for this work by a simple variation of the lower tension, permitting work which it is said cannot be accomplished with a shuttling machine.

WATERBURY BUTTON COMPANY.

This company sent a case of metallic buttons in great variety, including army, navy, railroad, police, state, school and livery buttons. The company also manufactures ladies' belt buckles and clasps, medals, badges and other small articles from sheet metal.

The jury awarded an Honorable Mention.

COLT'S PATENT FIRE ARMS COMPANY.

The Gatling gun made at the Colt's Patent Fire Arms company's armory, in Hartford, is shown here in several forms and sizes. One is a short, five-barreled gun mounted on a tripod, and two others have ten barrels and are mounted on wheels in the usual gun-carriage form. The Centennial judges considered this one of the best machine guns known, and reported upon it in the following terms :

"Eminently entitled to recognition not only as one of the best machine guns in existence but also as the first really serviceable weapon of its class. A new five-barrel gun is exhibited, showing improvements over the usual pattern in respect to simplicity, the automatic spreading of the shot, the feeding arrangement, and adjustments for adapting the gun to receive metallic cartridges having rims of varying thickness ; diminished weight ; increased facility in extracting the locks ; and, generally, in separating the gun for cleaning, etc." These guns, when mounted on wheels, are provided with the Patent Sarven Wheel made by the New Haven Wheel company. The gun scarcely needs description here. It still stands in the front, and has gained a higher recognition and reputation by this exhibition at Paris in competition with all other makers of machine guns. The jury accorded it a Gold Medal.

SHARP'S RIFLE COMPANY.

The Sharp's Rifle company, of Bridgeport, exhibited breech-loading military and sporting rifles for which a Silver Medal was awarded.

GARDNER MACHINE GUN.

The Gardner machine gun was exhibited by Pratt, Whitney & Co., of Hartford, and received a Gold Medal.

HOTCHKISS REVOLVING CANNON.

The gun of Mr. B. B. Hotchkiss, although made in France, was shown in operation during the exhibition and may be claimed as a Connecticut invention, Mr. Hotchkiss being from this State. The jury of Class 68 decreed a Gold Medal.

UNION METALLIC CARTRIDGE COMPANY.

A full suit of samples of the metallic cartridge shells made by this company was exhibited in a wall case along side of the space assigned to Mallory, Wheeler & Co., of New Haven. The jury awarded a Silver Medal. At the Centennial the award was given for "Metallic cartridges for Military purposes and especially the Berdan patent central fire cartridge." "Com-mended for the system of constructing the cavity in the head of the shell, the anvil in the same on which the primer is exploded being formed from the same metal from which the shell is drawn, the conical form of the anvil assisting the effect of the blow of the firing-pin when striking the cap to ignite the fulminate; the primer perfectly water-proof and formed complete from one piece of metal, avoiding all danger from additional pieces dropping out and causing miss-fires; the whole forming a perfect and complete system for exploding centre-fire cartridges and for rendering them perfectly imper-vious to temperature and water, and adapting them to ready reloading after firing."

J. E. STEVENS COMPANY—TOYS.

Of the six exhibitors of toys in Class 42, only one is from Connecticut. The extent to which this industry has been developed in the United States is surprising. Considerable capital is invested in it and a large market is opening abroad. The J. E. Stevens Company, of Cromwell, exhibits a variety of cast iron toys, chiefly toy pistols and savings banks, highly colored to educate and meet the popular taste of the rising generation. A greater measure of success would probably be secured for this manufacture if more care and taste were bestowed upon the designs and coloring. There is room for improvement in an artistic way. Lovers of art can do a little missionary work in this direction.

GROUP V.—MINING INDUSTRIES, RAW AND MANUFACTURED PRODUCTS.

CLASS 43.—MINING AND METALLURGY.

This class, as may be inferred from its title, was one of the most comprehensive in the Exhibition, for under the head of "*Metallurgy*" nearly all the forms of hardware, hollowware and edge tools were included. There were nearly seventy exhibitors from the United States in this class, fifteen being from the State of Connecticut. We here found the edge tools of the Collins Company; the saws and other tools of Disston; the locks of Mallory, Wheeler & Co., of the Russell & Erwin Mfg. Co., of the Yale Lock Company, and of other makers. The American lock and hardware industry was unusually well represented abroad by these exhibits, most of them from this State. The extent and variety of our locks attracted much attention. The forms and method of manufacture differ greatly from the European. Early in the operations of the international jury, considerable prejudice was manifested against cast iron lock cases and American locks, but solely on the ground that cast iron does not possess the requisite strength. To an American the French appear to be prejudiced in favor of the old-fashioned sheet iron boxes or lock cases, the material which we in the United States discarded long ago in favor of the more rigid and really stronger cast iron. The foreign prejudice is due in great part to ignorance of the superior quality of the iron which our manufacturers produce by a judicious mixture of pig of certain brands, and its treatment. Our castings are made with more care and precision than an ordinary observer or a foreign manufacturer, unused to our methods, would suppose. We may claim, perhaps, that the superiority of our magnetic and specular ores has something to do with the result. We are at any rate able to produce sharp, clean castings with smooth surfaces requiring little or no finishing. This perfection of form and surface extends also to the small working parts of locks and other pieces of hardware, so that each piece is a counterpart or duplicate of another, and may be substituted for it without alteration or fitting. This

interchangeability of parts is an important matter to both the manufacturer and the consumer.

The American mixed iron used by our manufacturers is an alloy which differs essentially from the ordinary cast iron of Europe. Instead of being hard and brittle it is soft enough to be cut and filed with ease. It is more or less ductile and malleable, partaking of the qualities of malleable iron. It has the needed toughness and strength for all the parts of locks and may be fashioned and proportioned in the pattern so as to distribute the material where it is needed, and especially where bearings and pins are required for the working parts. This is impracticable in the sheet iron case, where the pins and supports are riveted into holes and are always liable to work loose. Besides, no two pins can be inserted and riveted in exactly the same way, while in the casting there is no variation, all the pieces from the same mold are alike.

The French are, however, in some instances, beginning to make cast frames and working parts, chiefly however where highly decorative and elaborate rim-locks are required. Some castings are converted into "malleable iron," others are made of *steel*. There is great progress in this direction—the utilization of crucible metal for decorative objects and hardware generally.

It is interesting to note that the industry of house-builders' hardware in the United States was initiated, at least in respect of mortise locks, in this State, and with wrought or sheet iron for the cases and the working parts.* This was for a mortise lock with one or more tumblers. The French locks are, however, to be highly commended for good workmanship and a high degree of finish of the internal parts. These are generally ground or draw-filed to a bright surface. The bolts are heavier and stronger usually than ours, and have the double throw by which the bolt extends nearly two inches beyond the lock and will reach across a wide crack or open space between a door and the plate on the jamb. More attention is bestowed upon the springs than is given to them in our cheap locks. Instead of brass wires or little coils of wire as many of our common locks have, the French make a thoroughly good steel

* At Westville, near New Haven, at the works of Blake Brothers.

GROUP V.—MINING INDUSTRIES, RAW AND MANUFACTURED PRODUCTS.

CLASS 43.—MINING AND METALLURGY.

This class, as may be inferred from its title, was one of the most comprehensive in the Exhibition, for under the head of "*Metallurgy*" nearly all the forms of hardware, hollowware and edge tools were included. There were nearly seventy exhibitors from the United States in this class, fifteen being from the State of Connecticut. We here found the edge tools of the Collins Company; the saws and other tools of Disston; the locks of Mallory, Wheeler & Co., of the Russell & Erwin Mfg. Co., of the Yale Lock Company, and of other makers. The American lock and hardware industry was unusually well represented abroad by these exhibits, most of them from this State. The extent and variety of our locks attracted much attention. The forms and method of manufacture differ greatly from the European. Early in the operations of the international jury, considerable prejudice was manifested against cast iron lock cases and American locks, but solely on the ground that cast iron does not possess the requisite strength. To an American the French appear to be prejudiced in favor of the old-fashioned sheet iron boxes or lock cases, the material which we in the United States discarded long ago in favor of the more rigid and really stronger cast iron. The foreign prejudice is due in great part to ignorance of the superior quality of the iron which our manufacturers produce by a judicious mixture of pig of certain brands, and its treatment. Our castings are made with more care and precision than an ordinary observer or a foreign manufacturer, unused to our methods, would suppose. We may claim, perhaps, that the superiority of our magnetic and specular ores has something to do with the result. We are at any rate able to produce sharp, clean castings with smooth surfaces requiring little or no finishing. This perfection of form and surface extends also to the small working parts of locks and other pieces of hardware, so that each piece is a counterpart or duplicate of another, and may be substituted for it without alteration or fitting. This

interchangeability of parts is an important matter to both the manufacturer and the consumer.

The American mixed iron used by our manufacturers is an alloy which differs essentially from the ordinary cast iron of Europe. Instead of being hard and brittle it is soft enough to be cut and filed with ease. It is more or less ductile and malleable, partaking of the qualities of malleable iron. It has the needed toughness and strength for all the parts of locks and may be fashioned and proportioned in the pattern so as to distribute the material where it is needed, and especially where bearings and pins are required for the working parts. This is impracticable in the sheet iron case, where the pins and supports are riveted into holes and are always liable to work loose. Besides, no two pins can be inserted and riveted in exactly the same way, while in the casting there is no variation, all the pieces from the same mold are alike.

The French are, however, in some instances, beginning to make cast frames and working parts, chiefly however where highly decorative and elaborate rim-locks are required. Some castings are converted into "malleable iron," others are made of *steel*. There is great progress in this direction—the utilization of crucible metal for decorative objects and hardware generally.

It is interesting to note that the industry of house-builders' hardware in the United States was initiated, at least in respect of mortise locks, in this State, and with wrought or sheet iron for the cases and the working parts.* This was for a mortise lock with one or more tumblers. The French locks are, however, to be highly commended for good workmanship and a high degree of finish of the internal parts. These are generally ground or draw-filed to a bright surface. The bolts are heavier and stronger usually than ours, and have the double throw by which the bolt extends nearly two inches beyond the lock and will reach across a wide crack or open space between a door and the plate on the jamb. More attention is bestowed upon the springs than is given to them in our cheap locks. Instead of brass wires or little coils of wire as many of our common locks have, the French make a thoroughly good steel

* At Westville, near New Haven, at the works of Blake Brothers.

spring, generally, for the latch-bolt, in the form of a flat or volute spiral with a brass tip or roller at the end where it bears upon the latch. It has great elasticity and strength and rarely gives out. Such springs constitute a special branch of manufacture and are made in a great variety of sizes.

MALLORY, WHEELER & COMPANY.

This firm, established since 1834, manufacture exclusively door locks, padlocks, door knobs, and bronze trimmings for doors. They make this description of goods their specialty, and bend their energies to the improvement and cheapening of the objects. They sent a large selection to Paris, using the same large show case, 26 feet long by 15 feet high and $2\frac{1}{2}$ feet wide, that they had at the Centennial. The exhibit was taken to Paris by the company's agent, Mr. Elliott Littlejohn, and was the first installation completed in the United States section. Upwards of five hundred different samples were displayed in this case, all of them arranged upon a smooth background of bird's-eye maple veneering. There were some four hundred locks and about fifty different styles of padlocks.

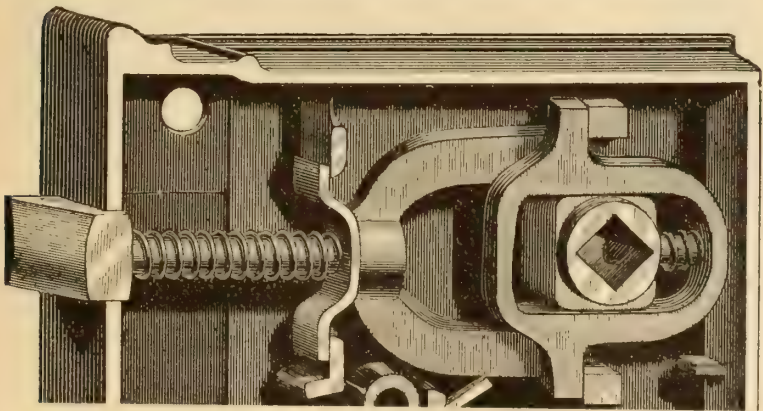
This display of locks, of so many different styles, and all of them so accurate in workmanship and moderate in price, attracted great attention from the French and others unaccustomed to the manufacture of locks on a large scale by machinery and of cast iron chiefly. Most of the European locks are made by hand, unaided by automatic machinery, and the sizes and varieties are few compared with ours. The interchangeability of parts, or rather the production of large numbers of any one part each so exactly similar to the other that one might at any time be substituted in the mechanism instead of the other, as is the case with our American cast and machine-made locks, was a feature which elicited many commendations from members of the jury.

The "hotel lock," one of the specialties of this company, was another novel and somewhat surprising feature of the exhibit. In these locks, which are apparently all alike, the keys are not interchangeable. Each lock requires its proper key, so that in a house, we will say with one hundred and forty locks and keys for as many rooms, no two keys can be found that will open

the same lock, while a single master key is applied that will open all. These locks are marvels of mechanical skill and are very cheap considering the accuracy of the work and internal mechanism. They are supplied in sets of from fifty to one hundred and forty and are safe as against any of the keys except that fitted to each lock separately, and the master key, which will pass all.

Reversible Door Latches.

The Reversible Door Locks for either right hand or left hand doors were also an interesting novelty to most of the foreign visitors. This lock is so made that by simply pulling the latch bolt forward and turning it half way round the sloping surface of the latch is turned in the opposite direction, thus adapting the lock to any door opening right or left. This can be done by the joiner when fixing the lock on the door, and without in any way deranging the mechanism of the lock. It readjusts itself as soon as the turn is made. When fixed to the door the latch cannot be again reversed without dismounting the knob and withdrawing the spindle. It is thus secure from accidents due to meddling. The internal mechanism of this reversible lock is shown by the accompanying wood engraving.



Reversible Door Latch.

It will be seen that the result is accomplished by means of a movable yoke on the spindle, which yoke is held securely in its place by the spindle when inserted, bearing against the end of the pin shown on the right. This pin prevents the latch being

drawn forward while the spindle is in its place. When it is removed the pin is free to move and thus permits the yoke to be drawn forward far enough to allow the square head of the latch to extend beyond the case and to turn around. The little spiral spring around the pin serves to draw the yoke back to its place and with it the pin, leaving the socket free for the insertion of the spindle. The mechanism is thus automatically readjusting, requiring no effort or care on the part of the workman. All the parts readjust themselves and none of the mechanism is displaced. This and the simplicity of the contrivance is the basis of a strong claim for superiority by the manufacturers, who challenge comparison and trial with any other form of reversible latch.

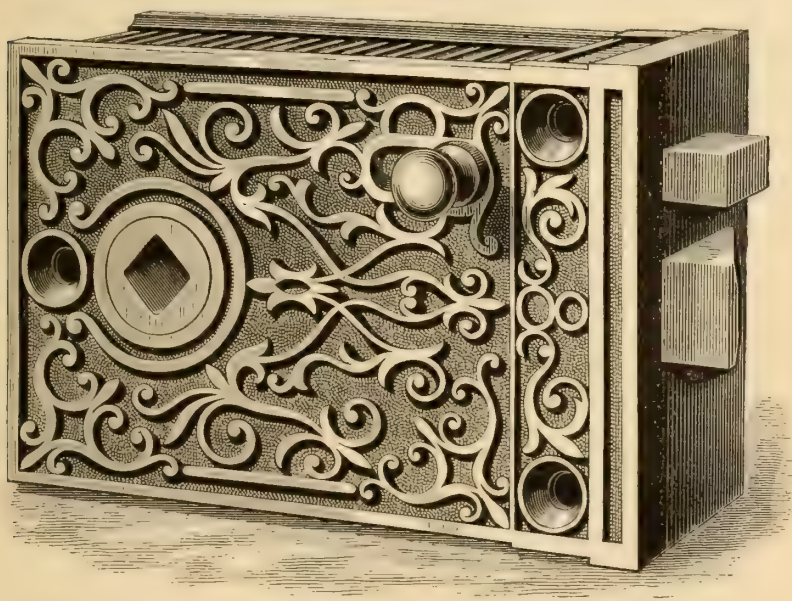
Exhibit of Padlocks.

Messrs. Mallory, Wheeler & Co. were the first to manufacture padlocks extensively in the United States. They now make over one hundred different styles and sizes, and use both iron and brass. A good selection from these styles was shown in Paris. For beauty of finish and cheapness they appear to be unrivalled. The lacquered or "japan" work on the padlocks as well as on the door locks, is unequalled by any foreign manufacturer for lustrous black, a high polish, and durability. The only padlocks in the foreign sections of the Exhibition comparable with those of Mallory, Wheeler & Co. were in the Austrian section, in the exhibit made by a Moravian firm. These attracting the attention of Mr. Littlejohn by reason of the unusually good quality of the black japan, and their general resemblance to Mallory & Wheeler's locks, were closely examined by me, and proved to be in reality some of Mallory & Wheeler's locks, from which the trade-marks had been intentionally removed by filing down the brass drop, which covers the key-hole, and by dissolving off the lettering in white lead paint which had been put upon the samples when sent out from the works.*

* The manufacturers of this State have had a somewhat similar experience in several other instances. I have been told of a similar case at a former exhibition where the famous pumps of Douglas had the name filed out, and were shown as a foreign product. Such frauds are too odious and open to detection to be common. They are, nevertheless, a tribute to the superiority of American hardware, and will go far in dispelling the plausible objections raised in some quarters to the importation and use abroad of our manufactures.

Decorative Rim Locks.

The decorated rim locks of which a few samples were shown served to indicate the possibilities of manufacture in this direction. From an art point of view, locks as well as all other door trimmings should be decorative as well as merely of use to hold the door. There is no good reason for hiding the lock in a mortise unless it is to make it inaccessible and to get its uncouth and unfinished shape out of sight. The French and most European architects use rim locks and finish them in sumptuous styles, adorning them with carvings and gilded mouldings.



They are effective objects in the decoration of the interior. So also the window bolts are in full sight upon the sashes and are elaborately finished. The contrast between the cases of locks in the French section and those in the United States section was strongly marked, the French being decidedly the most brilliant and ornamental. The effort to decorate our American rim locks is to be hailed with pleasure, and should be encouraged by consumers.

There was some discussion amongst the members of the jury familiar with the hardware trade of France and Belgium, upon

the relative cost and prices of European and American hardware. It thus became interesting to learn something of the ability of such an establishment as this, devoted exclusively to locks, to compete with the French in the same line of industry. It was shown that the prices at the place of manufacture were much lower than the French. Messrs. Mallory, Wheeler & Co. were ready to furnish a good reversible knob lock, complete with knobs, escutcheons, screws, etc., ready for the door at twelve cents per door, and a padlock with a spring shackle and key as low as four and a half cents each. This was a surprise to many of the foreign manufacturers who made goods at extremely low prices and fancied that they could not have hurtful competition.

The firm has received awards at several exhibitions. At the Centennial, 1876, Philadelphia, their award was given for the following reasons:—"Commended as very superior goods, fine in finish, and tasteful in design." After a careful examination by the jury at Paris a Gold Medal was awarded.

RUSSELL & ERWIN MANUFACTURING COMPANY.

The goods exhibited by this firm were diverse in object, form and finish, but are referable to three chief divisions:

1. Builders' and general hardware.
2. Carpenters' and cabinet-makers' tools.
3. Wood-screws.

The first included a great variety of door locks, latches, padlocks, handles, bolts, hinges, pulleys, sheaves, fire irons and fire-place fittings, besides artistic fittings in bronze, nickel, gold and enamel for doors, windows and fire-place decoration. Under the second head may be mentioned chisels, gouges, screw-drivers, braces, wrenches, and general tools; and under the third, flat and round-head screws of all sizes, both of brass and iron, bright and blued. Of these objects, some were entered in Classes 11, 25, 43, 59 and 66, but were chiefly judged by the jury of Class 43 and the jury of Class 66.

The claims of the firm as presented to Class 43 in response to the official inquiries are as follows. In respect of peculiarities:

1st. The novelty and practical simplicity of the improved and patented mechanisms.

2d. The interchangeability of the machine-made parts or members and the precision and uniformity with which they are fitted and finished.

3d. The manner in which the parts are proportioned to the strains brought to bear upon them for the purpose of obtaining the greatest amount of strength and durability with the least expenditure of labor and material.

The particular merits claimed were : 1. The comprehensiveness of the display, embracing as it did 4,000 distinct representative specimens of all classes and grades, from ordinary goods of cast iron to the finest descriptions of artistic bronze fittings, finished in gold, nickel and enamels.

2. For door, cabinet and padlocks the combination in the highest degree of simplicity and durability of mechanism with scientific distribution of materials and of the labor upon them ; also, the lightness, strength, and convenience, with grace and beauty of form, of their steel keys.

3. The practical utility of their pull-out reverse latches, "which possess the only mechanism that satisfactorily accomplishes this object without seriously impairing the strength and durability of the movement."

4. For the Patent Anti-friction Latch, novelty, and the effective manner in which it serves to lessen the friction of latch bolts, and increase the durability and usefulness of the mechanism.

5. For Wood Screws, their improved form, sharpness of thread, smooth finish and uniform quality.

6. For Builders' Tools, superior quality of metal, smoothness and precision of finish and improved forms and proportions better adapting them to the uses for which they are intended.

Some of the products were repeatedly and closely examined with great interest by the members of the jury of Class 43, familiar with hardware of European manufacture. Surprise was expressed at the accuracy of the mechanism and, in general, at the low prices.

The enameled and gilt goods are obviously exceptional and of high cost. They are objects of luxury, and are suited only to the finest and most elaborately finished doors of hard wood. The enamel is of the *champ levé* variety and is highly satisfac-

tory as to quality. The composition is evidently good, and the colors are pleasing. The result shows a power over the details of this art which should give success if it were applied to the manufacture of objects of a purely decorative nature.

The castings in bronze deserve a special mention as choice examples of sharp casting with a perfectly smooth and finished surface, so smooth that it would at first seem that the metal had been worked over and engraved after being removed from the mould. The fine details of the engraved design are brought out satisfactorily, and do not require any finishing operation. Such castings are appropriate for door butts, knobs, escutcheons and finger plates for doors. They are used in plain uncolored bronze, or they are nicked or gilded according to the fancy of the purchaser.

The jury upon bronzes, art castings, and repoussé work, Class 25, made special note of these bronze castings, and in addition to the gold medals given by other classes awarded a bronze medal in recognition of their excellence.

Russell's Reversible Latches.

A few of the more important novelties shown by the firm in the way of locks and tools will be briefly noticed.

Reversible latches, as is well known, are so made that they may be adapted to either right or left hand doors, by simply pulling out and turning the latch or bolt before or after the lock is fixed in its place upon the door. Some of the objections which have been made to these latches are that their delicately formed parts and springs rendered them liable to break and to get out of repair, or that the bolts could be reversed at pleasure after mounting by mischievous children or malicious persons to the injury of the door and lock. These difficulties the firm claims to have overcome by Russell's patented improvements.

To illustrate this, the firm exhibited a six-inch mortise lock with the cap plate removed so as to expose the working parts. The latch bolt has a head bolt of the ordinary form, but the shank is round and has a shoulder and button at its small end which serves to connect it with the yoke in such a way that the movement of the latch longitudinally is controlled by the

yoke, but after the head of the bolt has been drawn forward beyond the face plate of the lock, it can, by reason of its swivel connection with the yoke, be freely turned to the right or left. A spiral spring restores the latch to its proper position after it has been reversed or operated on by the knob.

With the ordinary construction of follower it would of course be impossible to draw the latch bolt forward, but it is seen by an inspection of the lock that this follower consists of three parts,—the two parts are hubs provided with ears which dovetail into each other, so as to form of the two a compound hub, having a slot in the center through which the T before the knob spindle has been inserted, is free to slide sufficiently to allow the latch bolt to be drawn forward and reversed; but after the spindle has been fixed in its position, this T can no longer be moved, and the three parts are united to form a solid hub, which operates through the yoke upon the bolt in the usual way, and of course prevents the reversal of the latch.

Instead of the spiral spring, a heavy flat steel or brass spring can be used with equal facility.

The T is the part of the mechanism upon which most of the wear and strain fall, and is made of wrought iron or steel. The pieces called hubs are made of cast-iron or gun-metal.

From the description it will be seen that this invention provides, at very moderate cost, a mechanism which is fully as strong as the old form of latch, and not likely to become deranged easily, and which, before it has been placed upon the door, can be reversed at will by simply pulling out the head of the bolt and turning it half way round, but once fixed in position upon the door it becomes impossible to reverse and it operates as an ordinary latch.

Anti-Friction Latch.

In closing a door unless the latch bolt is in the very best condition as respects lubrication, and in the position of its sloping surface upon the “striker” or plate of the jamb there is a great amount of friction, and often a serious shock and jar, causing the flat side of the latch to bear directly against the lock case, thus producing a great amount of friction, so that frequently the bolt binds and refuses to move unless violence

and slamming is resorted to. To obviate this difficulty, Messrs. Russell & Erwin have invented and patented a supplemental bolt placed just below the ordinary latch bolt and connected with it so as to control its motion. It is a strong and effective arrangement for reducing to a minimum the friction of latch bolts, and giving them a smooth, uniform and easy action.

The improvement, by an exceedingly simple, strong and durable mechanism, causes the striking plate to act directly and without loss of power to force back the bolt, which, in its motion, is entirely withdrawn from contact with the lock case, so that the slightest motion imparted to the door causes it to latch surely, gently and noiselessly, and renders slamming alike difficult and unnecessary.

The operation is as follows:—beneath the latch bolt of the ordinary form is placed an auxiliary latch or controlling lever, which is pivoted so as to swing in a horizontal plane. It is provided with a pin, on its upper surface, which projects into a grooved recess in the under side of the latch, and connects the two in such a way that the slightest swinging motion of the lever pushes the bolt back, and so guides it in its motion that it is entirely withdrawn from contact with the lock case. It will be observed that the face of the auxiliary latch is in advance of the nose of the bolt, and consequently in operation it comes first in contact with the staple fixed upon the doorway, and acts directly and without any mechanical loss of power to force back the latch.

This mechanism transforms the rubbing into rolling friction upon the nose of the bolt, prevents the extreme pressure upon its face, increases the durability of the lock, and is of especial value for glass or heavy doors.

This improvement was shown not only in detached locks and latches, but by mounted samples upon doors so that their action could be witnessed and tested.

Steel Keys.

Two important qualities of keys are strength and lightness, a combination which can best be secured by making them of steel. A full assortment of such keys was exhibited, and some of them for doors and padlocks were illustrated in full size engravings in the circulars issued by the Company.

The peculiar feature common to them all is that the bow, stem and bit of the key are made in one piece, from spring steel. Owing to their form and method of construction they are produced entirely by machinery at a very moderate cost. The advantages of these keys are : they are nickled to prevent rusting, they possess light, convenient and graceful forms, and combine the highest amount of strength and durability with a minimum expenditure of labor and material.

Anti-Friction Pulleys.

With the increasing use of heavy plate glass windows and large window sash, a pulley with a strong and well-made axle becomes a necessity. The ordinary sham axle or steel pin pulley may answer very well for light sash which are not often raised, but even with light sash, if much used, there is a disagreeable amount of friction and wear. One of the principal defects, also, in the ordinary form of door and window pulleys is that, after they have been fixed in position, the axis of the pulley is not accessible either for cleaning or oiling, and the result is that the gradual gumming of the oil and the accumulation of dust and grit upon the axis, cause it not only to grind out the bearings, but to work with a great deal of noise and friction. These difficulties some inventors have attempted to overcome by providing various forms of oil passages with reservoirs leading from the face of the pulley to its axis, but these have proved only a partial success, from the fact that they greatly disfigure the face of the pulley, do not effectually prevent gumming or grinding, and require frequent cleaning. The peculiar feature of the invention shown in the exhibition, is that the wheel or sheave is mounted upon a series of small anti-friction rollers, made of steel, and fitted so as to run freely around a fixed central pin or axis. These anti-friction rollers are quite free at their ends, and therefore there is no friction at these points, as is the case where such rollers are supported in revolving rings. It is obvious from the construction that there can be no sliding friction ; and the inconvenience and unpleasantness arising from the use of oil is overcome. As there is none but rolling friction, the accumulation of dust makes but little difference in the operation of the mechanism, for the steel pins

roll about in it as readily as wheels upon a carriage road. The inventor does not claim that this system of anti-friction rollers is new, but that the simplified construction, and improved system of manufacture enable him to produce a greatly improved pulley without the objectionable feature of grinding, and vastly more durable than the old form. It can be produced by machinery at a cost permitting it to be sold for about the same price as a first-class pulley of the ordinary style.

Universal Hollow Auger.

The hollow auger exhibited by the firm in the collection of carpenter's tools of their manufacture is similar in principle to a scroll chuck and is intended for use either in a bit stock or a lathe. It differs from a chuck, however, in this, that two of the jaws are replaced by cutters and are provided with a clamp for holding them, while the other two jaws serve as guides. The four pieces are moved simultaneously from or towards the centre, by means of a scroll thread, which is furnished with a *chuck* nut, that prevents the slipping of the jaws after they have been adjusted for any particular sized tenon. For use as a universal chuck, it is not necessary to remove or in any way derange the cutters, as they are clamped so that the points are a little behind the holding face of the jaws, and cannot touch work that can be fixed in them.

It replaces the whole series of the old form of hollow augers, and from its facility of adjustment, and the readiness with which the cutters can be removed for sharpening, it is more efficient as a cutting tool, while at the same time, and without any change, it answers all the requirements of a universal chuck.

This exhibit was the first appearance of this firm at any of the great international exhibitions. In the most important matter of the installation and arrangement it was a model worthy of imitation. A case, rectangular in plan, 25 feet by 12 feet upon the floor, presented two broad sides. The ends were recessed, so as to form at one end an alcove somewhat secluded from the crowds of visitors, and at the other a small but convenient office where special explanations and exhibitions of the goods could be given to those specially interested. The doors

also to this office were fitted with the butts, locks, bolts and bronze trimmings made by the firm. A line of narrow table cases with inclined glass tops projected some eighteen inches beyond the upright cases and gave room for the display of the goods in the packages as put up for trade. The monogram of the firm was neatly executed upon a velvet back-ground in the central division of one of the vertical cases, by means of the wood screws of brass and iron arranged so as to form the letters. The number and brilliance of the bronze, nickeled, brass and plated screws gave this monogram the appearance, at a little distance, of rich gold and silver embroidery. The personal attention and supervision of Mr. H. E. Russell, Jr., the secretary of the company, was given to the preparation and installation of this exhibit. On Mr. Russell's return to Connecticut the company was represented by an agent, Wm. R. Comings, who was constantly in attendance to answer questions and give information.

The business of the Russell & Erwin Company was commenced in the year 1839. Now from 650 to 1000 hands are employed. Steam engines with an aggregate of 450 horsepower move the machinery. The factories have seven acres in area of floor space. The buildings are of brick. They are substantially built, are well ventilated, heated by steam, lighted by gas, and protected from fire by the best system of extinguishers and fire escapes.

The jury of Class 43 awarded a Gold Medal for the locks and hardware, including wood screws. The jury of Class 66 awarded a Gold Medal for the builders' hardware. The jury of Class 25 gave a Bronze Medal for the beauty and perfection of the bronze castings.

COLLINS & COMPANY.

Exhibition of Axes and Edge Tools.

Amongst the many interesting exhibits from the State, the display made by Collins & Company, Hartford, of axes, mining tools and cane knives, was one of the most beautiful and important. These tools, though of homely use and best known in practice in the backwoods, in the depths of the mine, and in the jungles of the tropics, were so perfectly finished and

polished and so tastefully arranged that they drew the attention of every visitor, whether workman or prince, who passed before them. The axes were generally recognized as the types of the true American or Yankee axe, the best in the world.

This exhibit was attractive by reason of the quality rather than the quantity of the tools displayed. Limited as to space, the company was content with a case of moderate dimensions, about eight feet long and eight feet high, much smaller than the case which was shown at the Centennial. But it was well proportioned and in good taste. Being made of plain, uncolored ash wood, it contrasted very well with the adjoining cases made of black walnut and ebonized woods. Every portion of the space was utilized. In the front, which was made in two divisions or panels, axes of the chief typical forms were grouped in one division, and a selection of machetes, cutlasses and hunting-knives in the other. At one end of the case mining picks and stone hammers were artistically grouped, and at the other, axes and hatchets with their white and beautifully proportioned hickory handles. No part of the case was too high to permit of the contents being conveniently examined, and all the objects were placed so near to the plate glass fronts that every detail could be distinctly seen. It was a model exhibit in these respects.

All of the tools were superbly finished, and polished to such a degree that they were like mirrors. The surfaces were as faultless as that of a telescope speculum, and so lustrous and silvery that a special notice was necessary to inform the public that the tools were neither silvered or nickeled. This high polish was not only ornamental but it served also to show the homogeneity of the metal, its solidity, and freedom from flaws. Commercial samples in ordinary finish, were also shown. The under part of the case was filled with boxes of axes in the state in which they are shipped to the trade and consumers.

Much might be written of the excellent qualities of the American axe; of its perfection of form, its studied adaptation to the work it has to do, the proper distribution of the weight of metal, the form of the eye and the shape of the helve. One cannot tell exactly *why* the lines should be just as they are, but we know from use and results that the axe of

to-day is far superior in shape to those made a generation ago. Only those who have had to use the foreign forms of the axe can appreciate the wide difference that exists between them and ours. The woodsmen of the United States and other countries seldom realize how much their labor in chopping is facilitated and rendered comparatively light by the thoughtful care and skill of Samuel W. Collins and his successors. The perfection which characterizes American axes is due, in great part, to their efforts, extending over a period of fifty years. But the manufacture as seen by the variety in the Collins case is not confined to the Yankee form. It includes a great variety of foreign forms, such as choppers have become accustomed to in other lands and prefer to any other.

Thus, in the collection, we find, besides a variety for use in the United States, such as the Kentucky and Yankee patterns, axes specially made for the Australian market, axes with oval and with round eyes, axes for Spanish countries and Mexico, for French settlements, and for South America and the tropics. The form of the eye of an axe must be adapted to the handles that each country supplies, for it is not the good fortune of other lands to have our beautiful white and tough hickory helve turned and fashioned to the hand, and nicely fitted to the axe. A round, rough pole cut in the forest, must suffice in many regions, and in such countries the narrow, accurately-formed elliptical eye of the Yankee axes would be comparatively useless. For green wood handles, a large full eye is required.

Typical Forms of Axes.

The annexed wood-cuts represent some of the chief types of axes shown by the Collins Company, and in use in various parts of the world.

The Yankee Axe is placed first in the series. This pattern is made in various sizes, from one and a half pound weight to seven pounds, and is used chiefly in New England.

The Kentucky pattern differs slightly, and is made of the same weight as the Yankee axes.

The Turpentine pattern is a long-bitted axe, especially useful in cutting soft woods. The sizes are from $3\frac{1}{4}$ to $3\frac{3}{4}$, 4, $4\frac{1}{2}$ and $5\frac{1}{2}$ lbs.



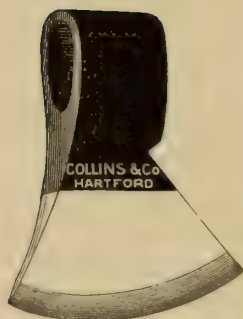
Yankee Axe.



Kentucky.



Turpentine.



Oval Eye Axe.



219.



De Tumba.



387.



118.



154.

The "Oval Eye Axe," with a rounded back and a broadly expanded bit, is like an ancient form known in France as the *Hache Danoise*. The weights of this pattern vary from 3 to 5 lbs.

Fig. 219 also represents an oval eye axe but with a square head, and the upper edge straight. These are made to weigh from 4 to 5 pounds each.

The De Tumba pattern, shown by the next figure, also has an oval eye, but has a round, smooth head like No. 11, but the upper edge is not curved as in Fig. 11, but is straight as in Fig. 219. The usual weight is from 4 pounds to $4\frac{3}{4}$ pounds.

Similar axes are made with round eyes, Fig. 387 weighing from 4 to $4\frac{3}{4}$ pounds. A longer and narrower form is shown in Fig. 118.

There is also the triangular eye, Fig. 154, allied in form to the French axes, with a long, thin bit. Weight about 4 pounds.

Historic Axes.

It is only just to this subject to at least note the very interesting series of historic and pre-historic axes in the galleries devoted to historic art at the Trocadéro. It afforded material for a very interesting monograph upon the axe and its uses in peace and in war. A comparison of the forms of axes of various countries becomes more interesting when we consider that the axe is par excellence a tool of universal use in all countries, and by all races whether savage or civilized. It antedates all history. In fact it, more than almost any other object, reveals to us the existence and habits of prehistoric races. Stone axes form a large part of every collection of prehistoric relics. And it is interesting to note that as great a diversity of form existed in the remote periods of the stone age as we now find in the age of steel. Some of the old stone axes at the Trocadéro exhibition of historic art are well-formed, and even have the medial ridge so important in diminishing the frictional resistance in the chopping. Some of the stone axes from Denmark are perforated to receive a handle, but, generally in pre-historic times, and even to-day in the South Sea islands, the handle is bound about the stone, or the stone axe is inserted in the wood. In New Zealand, axes have been made from time immemorial

of the beautiful green jade which abounds there. Such implements, wrought with difficult toil and patient care for months, were almost beyond price. They became heirlooms and evidences of power. But the polished jade of the Maori handed down so reverently from father to son is fast becoming a relic sought by museums and by lapidaries. It is being rapidly supplanted by steel.

The axe is the pioneer tool in the work of civilization. It precedes the plough and the hoe. Whoever improves and cheapens it lightens the burdens of humanity. In this great work the Collins Company stand foremost. Their axes are not only the best but they are the cheapest, and they are sent by thousands of dozens all over the world. Connecticut steel is thus prominent in subduing the earth. In other countries the pre-historic methods of making axes, one at a time, a few here and a few there, are still maintained. The manufacture has not become specialized and raised to the rank of a great industry. In Europe no one concern is responsible to any serious degree for the quality of the product. There is no vital necessity for the maintenance of a high standard of excellence, as with us where the reputation of half a century and millions of capital are involved. No such established manufacture can afford to send out an axe that has not been subjected to the severest inspection, and is not as perfect as can be made from the best materials and with the best appliances.

Collins Cast Steel.

It may not be generally known that the Collins Company makes the superior grades of steel which it employs and to the extent of hundreds of tons annually. The crucible steel ingots of this establishment were greatly admired in the government mineral and metallurgical exhibit at the Centennial, and the able experts of the metallurgy of steel upon the international jury at Paris this year were not unmindful of this when they made their inspection of the Collins tools. On comparing the fractures of the steel of the Collins axe with fractures of French axes, the most marked difference was found in favor of the American steel. It was found to be more homogeneous, compact and strong, and consequently could receive a superior

temper. There is also more of it. In two axes of the same weight, French and American, the American axe is found to have by far the greatest weight of steel.

In respect of uniformity of temper also the comparisons were in favor of the Collins axe. This results not only from the superiority of the steel but from the appliances used by the company for hardening and tempering on a large scale by which uniformity is secured. The company has also a system of testing and inspection which makes it almost impossible for tools faulty in make or temper to be sent out from the works.

Machetes, Cane Knives and Hunting Knives.

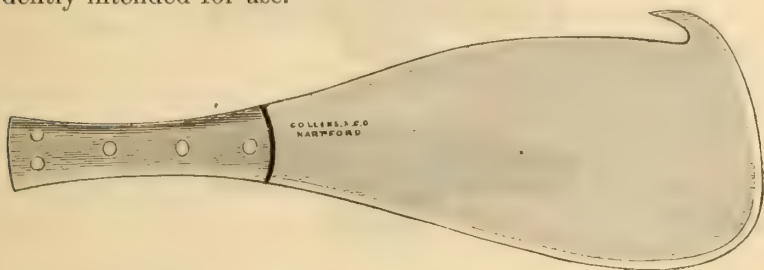
In addition to axes, picks and other tools, there was a representative selection of cane knives and *machetes*. The form of the machete is best shown by the accompanying wood cuts, showing not only the shapes of the blade, but some of the varieties of the handles, some of horn and others of discs of leather. Only those who have traveled in the tropics can understand what, and *why*, a machete is. It combines the functions of an axe, a sword, a bush hook, and a scythe. A broad, trenchant blade with a thin saw-like edge, it is just the thing to cut down sugar cane and bananas, or to slash an enemy to shreds. Almost every denizen of the jungles of Spanish America carries one. With it, by cutting right and left he makes his way along overgrown trails, and through thickets of palms, ferns and drooping vines. Some of these knives are as long as cutlasses but they are generally broader and shorter and very thin. In the manufacture by the Collins Company, great attention is given to the quality of the steel and to the strength and careful attachment of the handles, which are made of either horn, wood, leather, iron, or steel, and are made to last, and to fit the hand so as to give the owner of the knife a tight grasp upon it. The variety of shapes of machetes is almost as great as the diversity of fancies of the consumers. Over five hundred different shapes and sizes are made and sold.

The cane knife of the Louisiana pattern is shown by the figure, with a sharp hook at the back. The Cuba patterns differ by not having this hook, and they have straight backs. There is but little variation in the blades, but the handles vary, as will be seen by the illustrations.



Hunting knives, machetes and bush-hook.

Bowie knives of different patterns were also shown. The handles are thoroughly made and finished, and are worthy of the undoubted excellence of the blades. There is no slight, cheap work for show merely, but these instruments are evidently intended for use.



Collins' Mining Tools.

The mining picks and hammers of this exhibit occupy one of the end panels. They are exhibited in a variety of forms and leave nothing to be desired except perhaps a perpetual bonanza in which to use them. The picks are remarkable for the perfection of the eye, which is shaped with great care, a most important feature characteristic of the Collins tools, picks and axes alike, and one which foreign imitators would be glad to be able to claim honestly. The poll-picks revive in the mind of the miner the recollections of snow-white quartz at the bottom of the mine, with here and there nests and bunches of virgin gold holding the crystal together and yielding up at last only to the conquering steel.

Some of the principal forms of these picks are shown by the wood cuts. Pattern No. 484 is made weighing from 4 to 8 pounds; No. 485 from $3\frac{1}{2}$ to 6 pounds; No. 486 from $3\frac{1}{2}$ to 7 pounds. The California pattern is made from 3 to 8 pounds, and the pick mattock, very useful among roots of trees, generally weighs 6 pounds.

We can thus only glance at the variety, utility and excellence of the products of the Collins Company as shown in 1878 at Paris. According to the official data furnished to the jury of Class 43, the works were established in 1826 and now cover twelve acres of ground. The motive force, consisting of both steam and water, is about equal to that of 1200 horses. Upwards

of 3000 complete tools are made daily—and in addition to the tools described there is a large production of agricultural implements and steel ploughs.



No. 484.



No. 485.



No. 486.



California Pattern.



Pick Mattock.

The exhibit was carefully examined by the jury and the highest award—the gold medal—was accorded. This is but a just recognition of the merits of this long established manufactory. Another tribute, but not so intended, is that some foreign manufacturers have of late sought to introduce their goods under the Collins name, thus availing of a reputation acquired by a half century of honest and successful endeavor.

The establishment gives employment to about 500 men. It is the pioneer in the production of *finished* edge tools and originated the American shapes and forms now in general use. It is generally conceded that American edge tools have not only no superior but no equal in the uniform high quality, finish, fitness, workmanship and adaptation to public wants. These qualities, and their reduced cost, are extending the demand for them everywhere. As pertinent to this subject of the demand abroad for our American tools, the following extract is cited from the "Half-yearly Report" of the Birmingham (England) Chamber of Commerce, February 3d, 1870.

"Considerable attention has been drawn by our merchants to the mortifying fact that the United States are great exporters of edge tools, agricultural implements, and very many articles of small ware, not only to South America and the Brazils, but also to our own colonies. In Australia a very large proportion of the goods in a hardware store is of American manufacture, but made out of English iron and steel, paying a heavy duty, and manufactured by American workmen, earning fully 75 per cent. higher wages, and with the *value* of money much greater, thus beating us with charges on the raw material of 50 per cent., and on wages, &c. of fully 100 per cent., in the trades that used to be specially our own."

"This evidently shows that it is not a question of wages alone which is operating so disadvantageously against this country. It can therefore be attributed to the greater aptitude of the foreign [American] workmen, and their intelligence which induce them to seize every opportunity of improving their manufacturies by novelty of construction and by excellence of make."

The excellence of the axes and tools made by the Collins Company, and the high reputation they have gained in the markets of the world has led to many imitations, one notable instance occurring during the progress of the Exposition at Paris, a Sheffield manufacturer claiming to produce the "Collins axes," and strangely claiming to make a smoother and better eye, one of the peculiar points of excellence of the Collins tools.

At all of the great international and local exhibitions where the Collins tools have been shown, they have been recognized by high awards.

At the great International Exhibition in 1851, London, the first of the modern series of great exhibitions, and one of the most successful, the Collins Company sent a fine selection of axes and edge tools. The jury in reporting and referring to American tools said:—"Good as these productions are, they are perhaps surpassed by the axes, to which nothing of the kind can be superior; they are admirably finished, and at the same time display all those more valuable qualities which are the necessary conditions and evidence of perfection in such commodities. It is evident that the great prevailing want of the population has created and carried to perfection in its own neighborhood the trade which was to supply it."

In 1853, the Company received the gold medal for the same exhibition of edge tools. At the Centennial in 1876 a splendid display was made upon one of the main avenues of axes, adzes and edge tools, and the judges gave the following certificate to accompany the medal:—

"Axes, hatchets, picks, adzes, wrenches, cane knives, machetes."—"Commended as of best quality and finish."

At Paris, last year, 1878, the jury was unanimous in giving the Gold Medal.

YALE LOCK MFG. COMPANY.

The Yale Lock Manufacturing Company, Henry R. Towne, President, Stamford, made an exhibit not only highly creditable from the artisans' point of view, but one that was also a great convenience to every exhibitor in the United States section, to the Commission and to others. Reference is here made to the "Yale Lock Box Post Office" or "Yale Postal Bureau," established in the midst of the United States Section, where letters were received, distributed and mailed during the season. Mr. Geo. W. Sillcox, and his assistant, were in constant attendance. Boxes in the most approved form made by the company were provided, of different sizes, and were rented out for the season exactly as in our home post offices. There was also a "General Delivery" and window for the sale of stamps and a box for the posting of letters. All this was provided at the expense of the company, as the best way of exhibiting its locks and other products.

The list of the exhibits specifies: fine locks, time and bank locks and postal equipments. There were also vault and prison locks and decorative house trimmings.

The specialty of this company is the Yale Lock in its various forms. These and all of the products of the manufacture are characterized by fine, exact workmanship and finish, with novelty of design, adaptation to intended use and convenience. The locks are secure, the keys are small and light, and are not interchangeable. The postal boxes were fitted with these locks and gave great satisfaction.

The chronometer bank locks, of which two were kept running during the season, were exquisite specimens of workmanship. The highly finished works were in full view under glass and attracted great attention.

The jury awarded a Gold Medal and a Silver Medal. The company has also received awards at Paris in 1867, at Chile in 1875, and at Philadelphia in 1876. The report of the judges at Philadelphia was as follows:—

“Time, Safe-deposit, Prison, Door, Closet, and Drawer Locks, Post Office Box and Locks, Door Trimmings and Hinges.”

Report.—“These are well-made, substantial goods; the better grades are very finely finished, and are well adapted to their intended purposes. The model post-office, together with the boxes and locks, are neat and tasteful in design and a public convenience. The time locks are very fine specimens of workmanship and possess every element of security and protection against being opened except at the stipulated time, and by the proper person. The door knobs, handles and trimmings are fine and well-made goods.”

PETERS' COMBINATION LOCK.

The Peters Combination Lock Company of Waterbury made a small, compact exhibit of its peculiar combination locks, constructed upon a principle newly applied for such purposes. It is the invention of A. E. Peters, at Moncton, New Brunswick. They are machine made, the parts are interchangeable and they are not liable to get out of order. Keys are not required. The locks or combinations may be set as desired and

require for opening a pre-determined sequence of movement of the pins which protrude from the outside face of the mechanism. It is claimed for these locks that they cannot be picked, and that it is not possible to *see, hear* or *feel* a way to open them, and that it is a simple, cheap and secure locking device. It is applied to mortise night locks, latches for front and street doors, upright rim locks for store doors, rim latch locks for office doors, etc., mortise latch locks for office and house doors, trunk, chest, drawer, and cupboard locks, mortise desk locks (self-locking), for rolling top desks and ticket cases, flush desk locks (self-locking), padlocks, and post office box locks.

The manufacturers also claim the following advantages:—

“They are the only Combination Locks that can be opened without the combination being discovered by persons who are watching to get it.

They can be operated in the *dark* as well as in the light.

They are more easily and quickly operated than key locks.

They dispense with the necessity for carrying a key.

Innumerable changes of combination may be made by any person of ordinary intelligence.”

The jury awarded a Diploma of Honorable Mention.

SMITH & EGGE MFG. COMPANY.

This establishment, located at Bridgeport, F. W. Smith, president, Warren H. Day, secretary and treasurer, had a small but well-filled glass case, containing examples of their fine brass and nickeled padlocks, sewing machine locks, piano locks, and patent sash chain and fixtures.

The padlock which is known as the “Giant Lock” is simple, strong and secure, very smooth in its curves and finish, and is especially designed for, and used by, the government postal service for locking mail bags. They are made of superior wrought metal, with the rivet holes carefully countersunk and with from four to seven tumblers. The key is a thin strip of metal, and is inserted in a narrow slit at the bottom of the lock, so placed that water or dirt can scarcely enter.

Giant Sash Chain.

The company also manufactures a chain for supporting the weights of window sashes, which is called the “Giant sash

chain." It is a novelty for which great advantages are claimed. It is a machine-made chain, the links being stamped from sheet metal specially made for the purpose so as to give great strength. These chains are provided with fixtures by which they may be attached to the sash and weight and be removed at pleasure. It has been adopted for the windows of the new Capitol building at Hartford, and at other places. A similar chain is made for the use of plumbers and others and is both strong and cheap.

The jury gave a Bronze Medal.

BEVIN BROTHERS MANUFACTURING CO.—BELLS.

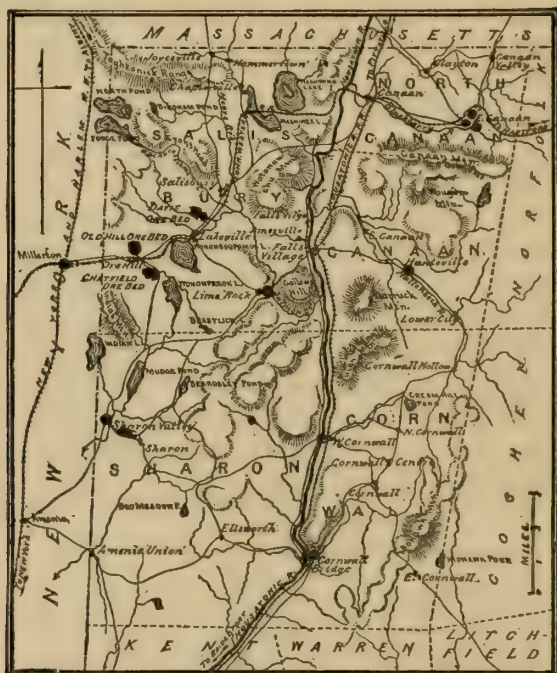
The Bevin Bros., of East Hampton, sent the same case which they exhibited at the Centennial, filled with a complete assortment of hand, house, table, gong, engine and all kinds of hand bells and sleigh bells. These last have an improved attachment to the girdle or strap, by a rivet and collar, believed to be much superior to the old method of fastening the bells. All of the bells shown are characterized by excellent tone and finish. The chief market for the sleigh bells is found in the United States and Canada. Silver Medal.

BARNUM-RICHARDSON COMPANY.

In the important group of "Mining Industry," the United States, as a nation, was poorly represented. With the exception of a collection from California, and the "bonanza mines," in Nevada, due chiefly to the liberality of Mr. Mackey, of Nevada, and to Mr. Hanks, of the California Committee, a block of anthracite coal from the Reading Railroad Company, and nickel and its ores from Joseph Wharton, of Philadelphia, the representation was from Connecticut. There was also an illustration of the Dupuy process of making iron; but for iron and its ores, "Old Salisbury," in this State, was the redeeming feature. This is due to the enterprise and energy of the Barnum-Richardson Company. It sent a very full collection of the famous Salisbury ores, the pig iron made from them and the car wheels made from the iron. The exhibit was contained chiefly in the same case used at the Centennial, in Philadelphia. A supply of descriptive pamphlets was provided, giving

analyses of the ores and of the iron and important statistics in regard to the strength, wear and durability of the wheels.

The mines, as is generally well known in Connecticut, are in the northwestern corner of the State, in Litchfield County. The little black patches in the accompanying wood-cut show their location.

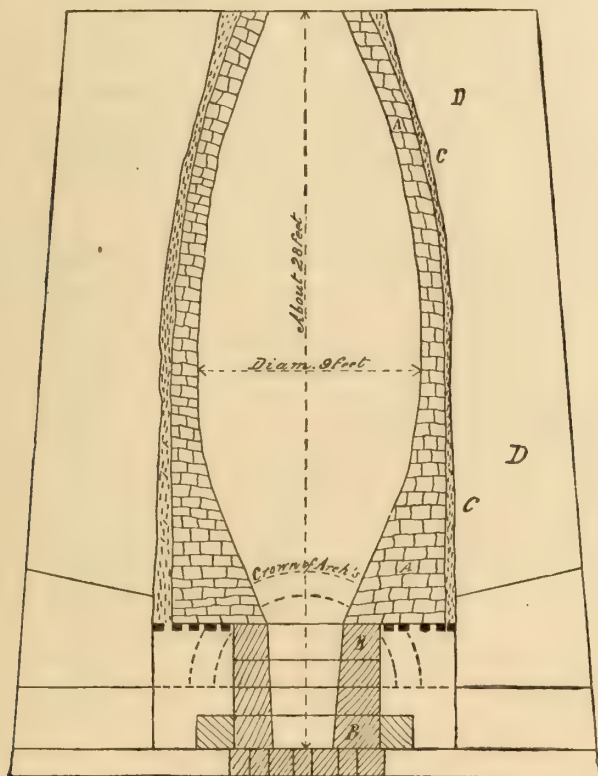


Map of the Salisbury Iron Region.

As early as the year 1734, a forge was erected in the village of Lime Rock, by Thomas Lamb. About 150 pounds of iron were produced at one time in what was known as a refining fire. In 1748, another forge was erected in what is now the village of Lakeville, and in 1762, the first blast furnace was erected. This is supposed to have been the first furnace built in the State. Its form and dimensions, as near as can be ascertained from data in existence, are shown by the annexed wood-cut section.

Its production of iron was about $2\frac{1}{2}$ tons in 24 hours. Three tons of ore and 250 bushels of charcoal were required to make

one ton of iron. The blast was supplied by an old-fashioned leather bellows driven by a water-wheel, in the most primitive manner.

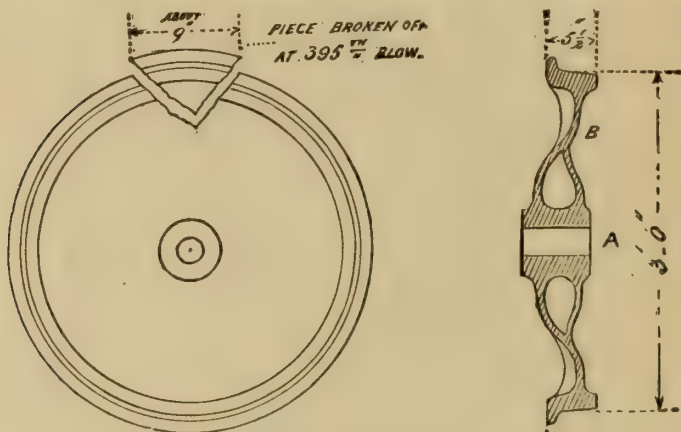


Section of the first blast furnace.

During the war of the Revolution and afterwards, large quantities of cannon balls and cannon were made here for the government. In the first part of the century, Messrs. Holley and Coffing carried on the manufacture of pig iron and bar iron for several years. In 1820, Milo Barnum, the founder of the present company, settled in Lime Rock, and about the year 1830 engaged in the manufacture of iron, associating with him his son-in-law, Leonard Richardson, and his son, Wm. H. Barnum, now the president of the company, late United States Senator.

The manufacture of railway material at their works dates from the year 1840. The excellence of this iron and its chilling properties render it specially well adapted to car wheels, for which it is now largely used. It is believed that 33-inch wheels of this iron will average at least 50,000 miles of service under passenger cars. Full records of the service of the longest-lived wheels are not yet complete. The report of the Lake Shore and Michigan Northern Railway shows that some of the wheels made of Salisbury iron have averaged about 200,000 miles in exceptional cases.

Experiments made at Horn's machine works, London, with wheels manufactured by this company, showed that 395 blows from heavy sledge hammers were required to detach a piece



Railway Car Wheels.

about nine inches long from the periphery of one of these wheels, weighing 626 pounds, and cast in 1868. An elaborate investigation of the strength and properties of the Salisbury cast iron has been made by Prof. R. H. Thurston, at the Mechanical Laboratory of the Stevens Institute of Technology, who has reported the results in full, with diagrams, and closes with the following general statement :

“Comparing these tests with the records of tests on irons of other manufacturers, it is seen, by examination of this table, that No. 2 is far superior in tenacity to English iron of the same grade in the several mechanical properties. In transverse

strength, the ratio is 1.3 to 1 in favor of Salisbury : at the elastic limit they are about equal. The English iron is most ductile.

"Tests of American iron are so few and so unsatisfactory as to render comparisons difficult. I have computed the records of a few from the Report on Experiments made by Captain Rodman, U. S. A., and by Major Wade, and from our records, all of which will serve to give some indication of the relative standing of Salisbury cast-iron.

"In tenacity, both in ultimate and elastic resistances, I have been able to find no records of iron of the same grade and fusion equal to them. The experiments made by Captain Rodman gave greater ultimate strength, the specimens having been cut from a gun (second fusion) from near the surface. It is not stated how the gun was cast, nor the quality of metal used.

"In all other mechanical properties, as exhibited in tests by tension, Salisbury cast-iron is found far ahead of all others to date, not excepting those tested by Captain Rodman.

"Under transverse stress, No. 2 is slightly below, except in ultimate strength, and No. 4 is superior, except in ductility, to the only American cast-iron tested by transverse stress of which we have found records; its grade is unknown, and the comparison is therefore of little value.

"In torsion, the elastic and ultimate strengths of No. 2 cast-iron are higher than those of any other iron of which we have records.

"In all valuable qualities the Salisbury irons, as is shown by the appended tables and diagrams, are exceptionally excellent. In combined strength, elasticity, ductility, resilience, and in homogeneousness, both in structure and as to strain, and in uniformity of quality in the several samples, they are proven to be very superior metals."

These wheels showing in their fracture the remarkable chilling properties of the iron combined with the requisite toughness of the central parts of the wheel, and the wonderful durability of such wheels shown by the record of mileage, were extremely interesting to the foreign experts on the jury. There was no hesitation in according to the Barnum-Richardson Company the Gold Medal.

The judges at the Centennial Exhibition, Philadelphia, 1876, reported the pig iron for car wheels as worthy of award "for its excellent quality;" and the jury of the group on railway apparatus commended the wheels "for excellence of the material and workmanship, and special adaptation to the construction of chilled wheels."

CONNECTICUT GRANITE.

The only granite shown from the United States was sent by Connecticut exhibitors. Few persons are aware of the extent to which the quarrying of granite is now carried on in this state; both for ordinary building purposes and for decorative work and fine monuments. Quarries are to be found along our whole water front on the Sound and even in the interior. We may place at the head of the list the

NEW ENGLAND GRANITE COMPANY,

of Hartford, well known for the magnitude of the work it has undertaken and executed, and the excellence of the material supplied by the extensive quarries at Westerly, upon the Connecticut line. The evenness of grain and color of this granite are best seen in the polished columns and monuments, of which many were executed for the State capitol. It was well shown also in the large and beautifully turned and polished urn sent to Paris. This granite seems to be absolutely free from all injurious minerals, such as pyrites, which, by decaying, would produce rusty stains. The constituent minerals are evenly distributed, giving a soft even gray color without the blemishes of nodular bunches or accumulations of mica sometimes seen. Its solidity and the absence of any decided "rift" or stratification render it susceptible of receiving the highest polish, and the most careful and elaborate decoration in detail. It is thus suited to the highest order of decorative construction, especially for fine statuary and monuments. These high qualities of the stones were also shown in the sample cubes cut and dressed in different ways. Masses can be quarried as large as can be handled. That this granite has great strength is proved by experimental trials which showed a resistance of 18,000 pounds to the cubic inch. The company has also a fine and compact red

granite, and a very fine white variety. Both of these varieties have developed largely since the ledges were opened. Visitors to the Centennial will remember the colossal statue of the soldier cut in the grey Westerly granite, which adorned the avenue between the main building and Memorial Hall. At Paris, the statue of the Republic occupying the place of honor in front of the chief building was of plaster only. There was no statue in hard stone comparable with the New England Granite company's soldier at the Centennial, and no specimen of turned work superior, or even equal, to the polished urn. It is a great pity that this urn could not have had a better position than at the entrance to the Machinery Hall. But it was greatly admired and the jury gave it two medals, one in recognition of the granite and the other for superior workmanship. Two medals were given also at the Centennial Exhibition, Philadelphia, 1876, where the Company made a very fine display of monuments, of different styles and finish, and also a fine series of representative specimens in the Mineral Collection of the National Museum, in the Government Building. One large slab in particular, is worthy of mention for its evenness of grain and color, and its high uniform polish.

REDPATH'S RED GRANITE.

The red granite of Stony Creek was shown by the proprietor, F. W. Redpath, in a section of a large polished column. It resembles, and is thought to be equal in beauty to, the Scotch granite which is extensively imported. The grain of this stone is even and the color is rich. Four polished columns, each twenty-one feet long, and four feet in diameter, being the largest ever made, were supplied by this quarry for the new capitol building at Albany. This stone, which is also admirably adapted for all building and engineering work, is obtained in large quantities, and dimensions, convenient to shipping, and is supplied twenty per cent. cheaper than imported Scotch granite. The jury gave Honorable Mention and a Diploma.

ROSE PORPHYRITIC GRANITE.

The rose-colored, coarsely crystalline granite from the quarry of the Hon. C. J. McCurdy of Old Lyme, was shown by a beautifully polished block. This stone is remarkable for the beauty of the crystalline aggregation and the color, in both respects closely resembling the anciently quarried and worked Egyptian granite, of which we find examples in the Pyramids, and in the collection at the Louvre. The polished surfaces derive an additional beauty from the translucency and pearly lustre of the large feldspar crystals seen to best advantage in strong sunlight. There is a peculiar chatoyant gleam reminding one of the Oriental gem known as cat's-eye. All these qualities render this a peculiarly beautiful and valuable stone for ornamental work, it being especially suitable for pedestals and polished columns. It was greatly admired by the jury and by the distinguished chief of the government School of Mines, M. Daubrée, who has written a letter to Judge McCurdy expressing his pleasure in seeing such a beautiful granite, and desiring to obtain a specimen for the government collection in Paris. The quarry is situated on the old McCurdy farm about seventy-five rods from the New York & Boston Shore Line Railroad, and about fifteen rods from boatable tide-water, leading at a distance of three-fourths of a mile to a navigable arm of the Connecticut river, near its mouth. The stone is easily quarried, dressed and sawn, and receives a high polish. It is very durable, and is equally well adapted to every form of use, rough or ornamental. The jury decreed an Honorable Mention and Diploma.

MINE HILL GRANITE.

The gray granite of Mine Hill Quarry, Roxbury station, Litchfield county, was represented by a polished block from Mr. E. Mower. This is a granite of extremely fine grain, and light color. It is compact, durable and cheap, and noted for its fire-proof qualities. It is largely used for foundations, copings, posts, window caps and sills, and for curbing. Unlike the other quarries, it is in the interior, and the transportation is by rail. To this, as to the others, a diploma was awarded. The jury purposely refrained from giving the highest grades of medals

to natural products, such as building stones, slates, and clays. Some of the largest and most highly polished granite monuments received nothing higher than the bronze medal. Under these circumstances the diploma is a high award. Many good exhibits were not mentioned. The superb green serpentine marble from Maryland received a diploma. Our Milford variety was not exhibited. There were a few blocks of the Connecticut river sandstone, and one slab containing fossil imprints, but this great branch of our mining industry was not as fully represented as it should have been. It is highly gratifying that all of the exhibitors of granite received awards.

NEW HAVEN WHEEL COMPANY.

This company, of which Henry G. Lewis, for many years the mayor of New Haven, is President, and General Edward E. Bradley, the Secretary, was organized in the year 1845 for the manufacture of carriage wheels on a large scale. The location of this now extensive industry is in the city of New Haven.

The Exhibit at Paris.

The Company sent to Paris a very full and complete selection of carriage, cart and fire-engine wheels, together with hubs and spokes, and the timber in various stages of preparation for working into wheels. The possession of the best quality of wood is, as will readily be seen, an indispensable condition in the production of superior wheels. This, fortunately, is possible, particularly in Connecticut, where the hickory wood grows in perfection. But it is not enough to have the wood at hand, the greatest care and skill is required in cutting, seasoning and selecting it. The second growth of hickory and white oak are preferred and used. The straightest and smoothest trees are selected and are felled, not by the axe but by a saw, so as not to split or injure the solidity of the butts. These butts are then cut up to the best advantage for spokes, and the rough blanks are laid aside, stacked under cover, and frequently turned for two years so as to become thoroughly seasoned. This necessitates having a large stock of wood on hand.

The variety of styles manufactured is very great. There are "French," "English," and "American," and the patent

"Sarven" wheel. Of the American style there are four different qualities, known as the "Extra," "No. 1," "No. 2" and "No. 3." Three qualities of the Sarven wheel are designated as "A," "B," and "C." Of the foreign styles, the French and the English, with "sharp-edged spokes" only one grade, and that the "best" is made. The spokes, rims and hubs are all made by machinery, and with such precision that similar parts are interchangeable.

There was a full display of these wheels in parts and complete, and cut in sections so as to display the construction and the excellent workmanship.

Sarven Patent Wheel.

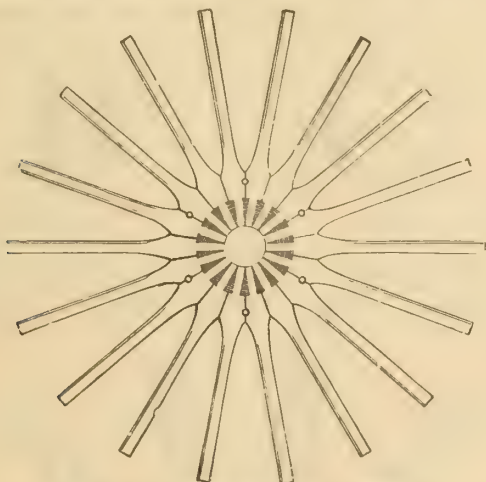
This wheel has been made and used for over twenty years by the Company, and its merits have been carefully studied. As a result of this it is commended by the Company as the best, strongest and most perfect and durable wheel made. That this judgment is correct there is no doubt. Those who have used it prefer it to any other wheel. It is adapted to all kinds of vehicles, from the lightest skeleton and buggy to the more bulky express, peddlers' and brewers' wagons; to massive wheels for artillery, for fire-engines and for the heaviest description of truck.

The peculiarity of this wheel is in the construction of the hub. It may be said to be a second hub, built around and upon the ordinary hub, and formed by the contact of the spokes one against another. This contact is ensured by making the spokes wedge-shaped, like the key-stone of an arch. They are accurately shaped so that no spaces shall be left when the requisite number of spokes is inserted and the spokes are driven "home." Each spoke has also a tenon beyond the wedge-shaped portion, and this tenon enters the mortises in the hub and extends to the box-cavity. The figures annexed show the construction and the several parts.



Spokes.

First, the spokes, made with their sides in one direction accurately parallel to the plane of the wheel, and in the other direction (the direction of the axle), the sides are radial to the centre and thus are wedge-shaped. This inclination of the sides is such that when the spokes are all inserted they will form a

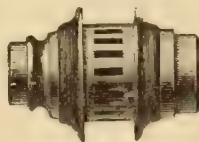


Section through Hub and Spokes.

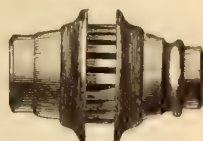
continuous solid disc, as shown in the next illustration, representing a wheel in vertical section through all of the spokes and the hub. This shows how the tenons enter the hub, represented by the shaded portion, and form a continuous solid arch around it. This central hub of selected timber, with mortises at regular intervals is represented by Fig. No. 2. It will be observed that it projects as usual in each direction from the spokes,



No. 2.



No. 3.



No. 4.

and that it has a slightly conical or taper form each way from the circle of mortises. This is designed to receive an iron flange on each end, as shown in No. 3. The hub is now ready for the spokes, which are inserted one by one and are driven firmly "home" in succession around the circle. The flanges

are then forced together until they come into close contact with the flat surface presented by the arch of spokes. (Fig. No. 4).

The flanges (No. 4) have a flat or plane surface to correspond, but the portion which comes into contact with the hub has a bevel to exactly correspond with it, so that when the flanges are finally forced into position they not only reinforce and

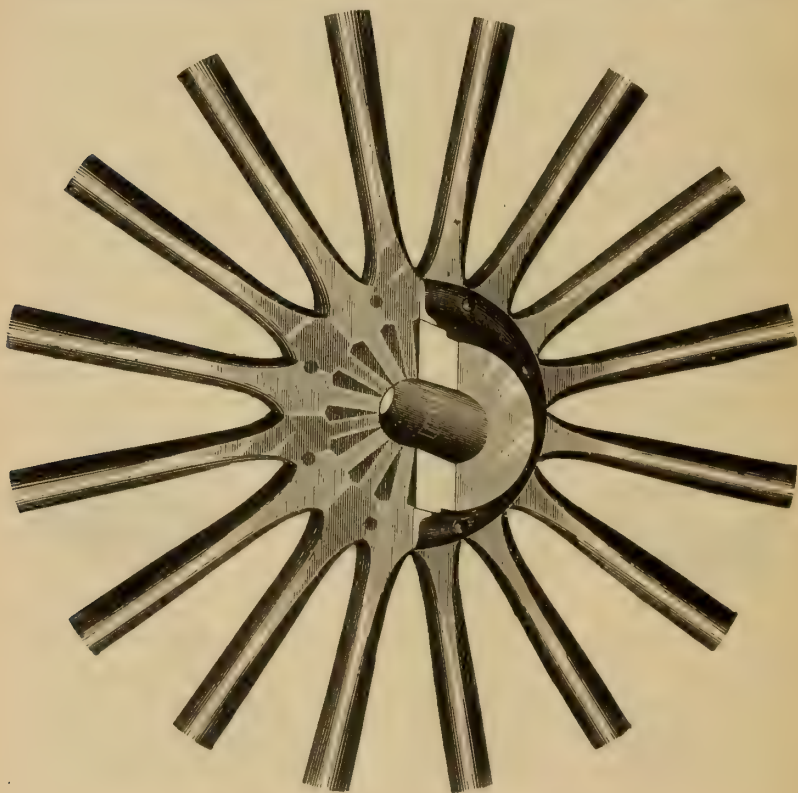


No. 6.



No. 5.

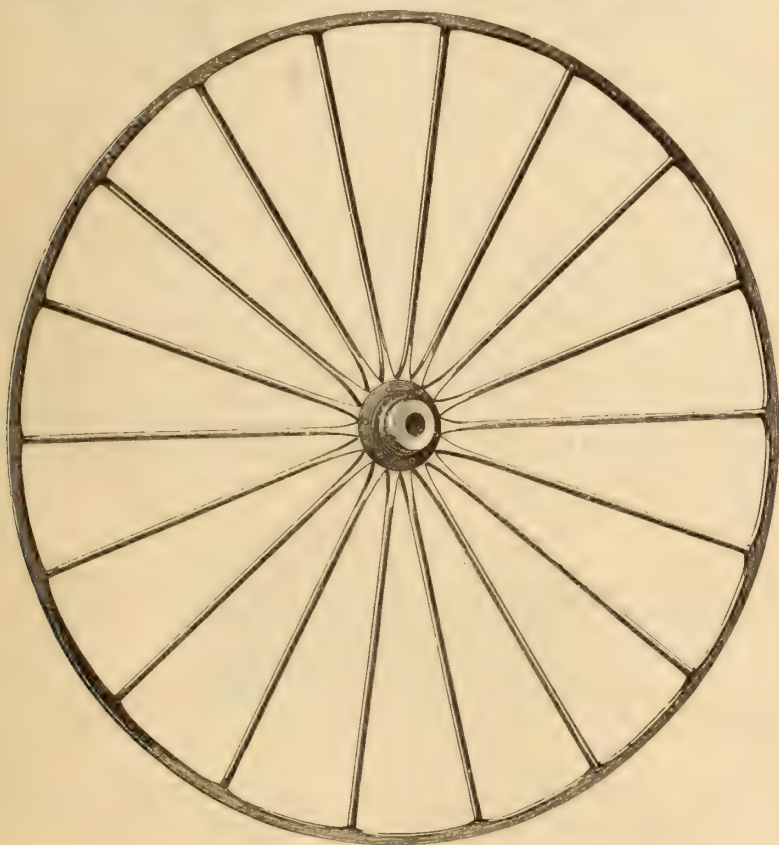
sustain the arch of spokes around the hub, but they clasp and strengthen the hub so as to prevent it from splitting. These flanges are like two strong bands and they form, as it were, a



Section showing interior of genuine "Sarven" wheel.

third or iron hub, or armor, covering and sustaining the wood. Each band, as shown in the figures, is connected with and held tightly to the other by means of bolts passing through from side to side between every alternate spoke.

The illustration, p. 86, shows a completed hub with one half part in section so as to exhibit the interior of the hub, the tenons, the arch of spokes, and the hub flange in position. The appearance of the complete wheel with rim is here shown.



Complete Sarven Wheel.

It is impossible to conceive of a stronger and more simple construction than this. The point of greatest strain upon each spoke is at the hub, and in this wheel it is met by the greatest thickness of the spoke. The material is left where it is most

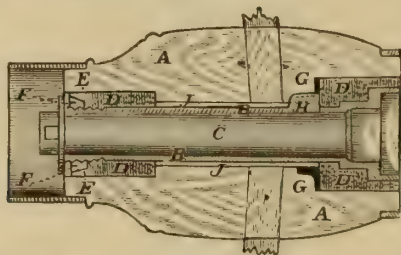
wanted, and with the grain or fibre of the wood uncut and fully supported by the adjoining spokes on each side. In the ordinary form the strain comes upon the spoke at just the place where it is weakened by cutting in order to form the shoulder of the tenon fitting into the mortise of the hub.

But practical use and long trial fully sustain the only conclusion to which one must arrive on analyzing the construction of this wheel—that it is the most scientific, thorough and durable wheel known. It is in use for fire-engines, where so much depends upon the reliability of a wheel, and for gun-carriages.

All, or nearly all, of the carriages for the Gatling gun are supplied with this Sarven wheel, made by the New Haven Wheel Company.

Rubber-cushioned Axle.

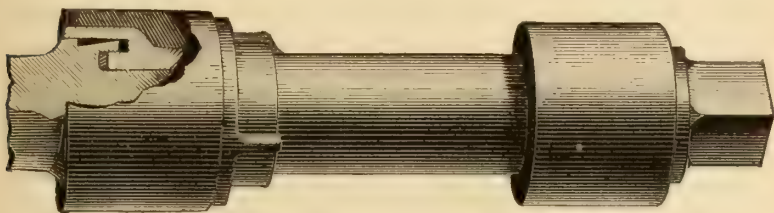
This modern improvement was also exhibited and is largely used by the Wheel company. It was one of the most recent of the novelties shown at the Exhibition, although it has been in use, on trial, for about two years. It consists of a vulcanized rubber cushion in the form of a thick band interposed between the axle-box and the wood of the hub, as shown by the figure, giving a sectional view of an ordinary hub, to which the cushioned axle is applied.



A—Hub. B—Axle Box. C—Axle Arm. D—Rubber Cushions. E—Compression Nut. F—Cavities in Compression Nut admitting points of the Wrench when compressing Cushions. G—Slotted Retaining Sleeve. H—Spur on Axle Box. J—Space between Axle Box and Hub.

It can be used on any vehicle, from the lightest road-wagon, to the heaviest truck. It saves a great amount of wear and tear upon the wheels and on all parts of the vehicle, and adds to both comfort and safety. Its form, and the method of applying it, are still further shown by two cuts, one representing

Miller's patent axle not fitted for rubber cushions, and the other the same axle made to carry the rubber cushions, as shown in place at each end.



Miller's Patent Axle, with Rubber Cushions, Complete.

The award at the Centennial to the New Haven Wheel Company was as follows: Wheels and Wheel Stock—"Com-mended for good quality and good workmanship."

At Paris the jury gave a Silver Medal.

SEWARD & SONS, CARRIAGE HARDWARE.

The iron fittings, straps, bolts, etc., for carriages, shown by Seward & Sons, of New Haven, were unequalled for nicety of forging, lightness and finish. They deserved a more conspicuous position than was given to them in the annex, and a higher award than the Bronze Medal.

BLAKE CRUSHER COMPANY.

The well known rock-breaker, or crusher, invented and patented by Eli Whitney Blake, of New Haven, was exhibited by means of the smallest, or "laboratory size," in which all of the latest improvements were fully shown. This exhibition of the invention in Paris was the first made on the part of the inventor in Europe, though the machine was shown at the Paris exhibition in 1867, by some French manufacturers, and at other exhibitions by the English and German manufacturers. At the exhibition in 1878, it was exhibited by two or more manufacturers in the French section, and two or more in the British section.

This is a labor-saving machine of the first order, and is now used in all parts of the world. It has cheapened and improved the construction of roads and railways; has facilitated the con-

struction of foundations, and has cheapened the reduction of ores, and consequently the cost of the precious metals.

The jury gave a Silver Medal to the "Laboratory Crusher," having already recognized the larger machines by Gold Medals in other sections.

WHEELER & WILSON MANUFACTURING COMPANY.

Sewing Machines.

The exhibits of this company were, under the classification, found in six different classes though not distributed in different parts of the exhibition. The sewing and embroidery work by the machine (Class 36), have been noticed. The Company had besides, samples of improved methods of finishing wood, and a newly-invented machine for book-binding, or rather book-sewing.

The company had space in the Machinery department, ten feet by twenty-five, and erected a raised platform covered with crimson carpet. Three large black walnut show cases contained the samples of the machine-work and were tastefully decorated with flags and fac similes of medals received at former exhibitions.

The machines included the well-known family machine, of which more than a million have been made, with all the recent improvements. There were also newly made straight needle machines designed for the use of manufacturers, tailors and shoe-makers, as well as families. Three numbers, Nos. 6, 7 and 8, of these were exhibited. Two of the machines were run at a very high speed by steam power—a speed which could be maintained only with the rotating hook.

Wood Finish.

The wood finish is a new method of filling the pores of the wood, preserving the grain and color of the wood perfectly and is both rapid and economical.

Book-sewing Machines.

The Wheeler & Wilson company also exhibited a novel and interesting machine for sewing books for binding. This is a great desideratum. It is compact, simple and efficient, and

gives a book with a very flexible back and an even strain upon all parts of it. It is claimed that it will accomplish, in an equal time, work that would require ten or twelve hands. The folded sheets are fed to the machine by hand. Three or more sets of needles carry the thread up into the fold of the paper or "signature" and over a short piece of tinned wire which is afterwards drawn tightly down by the thread into the angle of the fold and holds the signature securely. A little crinkling or corrugation of the wire prevents its falling out. This wire bears evenly along the surface of the paper and, unlike a thread drawn through the nick, or cut, in the signature, has no tendency to tear out, or cut the paper.

This company received a medal at London, in 1862, at Paris, in 1867, Vienna, in 1873, and at Philadelphia in 1876. This record is now extended by the *Grand Prize Medal* at Paris in 1878, a Bronze Medal and an Honorable Mention.

ENAMELED GRANITE WARE.

The St. Louis "granite" enamel, now so largely applied to all forms of iron hollow ware for household use, is not yet a Connecticut product, but it is sent to the State in large quantities to be mounted in silver and nickel and decorated at the establishment of Manning & Bowman, in West Meriden, by whom the complete mounted objects were shown in connection with the St. Louis Stamping Company. It is a stone-like enamel of a gray color and is remarkably adherent to iron, coating it so thoroughly that no metallic surface is left exposed, and the vessels so coated are, to all intents, as indestructible by acids as porcelain or glass. Unlike ordinary enameling it does not crack or scale off and is free from poisonous qualities. The tea and coffee services mounted in silver attracted great attention, and were easily disposed of. Before the exhibition had been open a month the large manufacturing firm of Japy frères had purchased the right of manufacture for France, paying a handsome sum to the American inventors, the Neidringhaus Brothers, of St. Louis, Missouri. This is another tribute to the estimation in which really useful American inventions are held abroad. The manufacture is to be commenced at once on a large scale, not only in France, but in Belgium and England.

The jury unanimously awarded a Gold Medal and some were in favor of giving a grand prize in recognition of this notable advance in the enameling art, for it is far superior to anything of the kind in Europe.

The mountings by Manning & Bowman were chiefly applied to tea and coffee-pots, to urns, water-pitchers and table furniture. The combination of the grey enamel with its ever varied mottling, and the silver or nickel mountings is very pleasing, and these objects drew great attention from all classes by reason of their novelty and beauty.

Enameled objects of this description are also made by the firm of Lalance & Grosjean, of New York, who also received a Gold Medal.

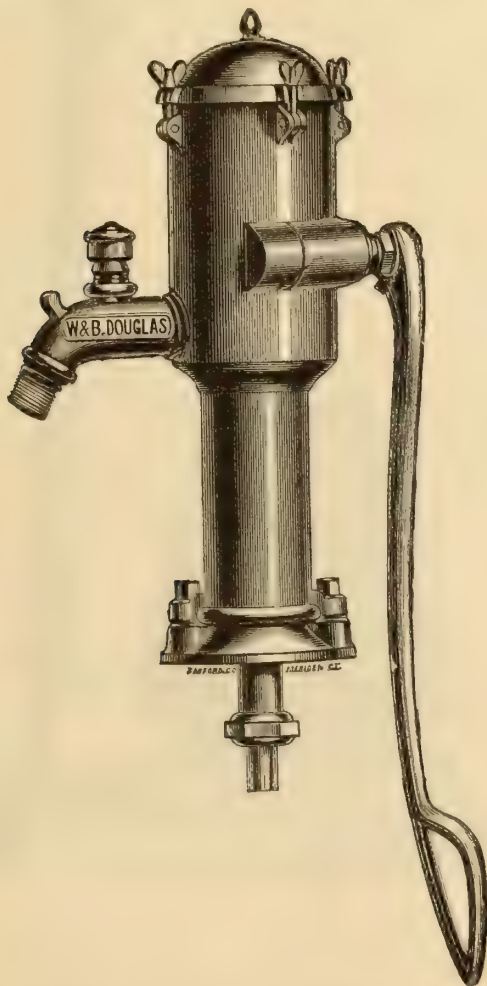
LEATHER BELTING.

P. Jewell & Sons, of Hartford, made in this Class, 49, a fine display of leather belts, consisting of several rolls of huge belting, a yard or so in width and of great length. All the belts were characterized by the uniform good quality of the selected leather, its evenness in texture, thickness, and finish, and the neat and skillfully executed joints. Considering the perfection to which this manufacture has been carried, and the evident want of accurately made belting in the foreign sections, where they seek substitutes in canvas and in hempen cables, there ought to be a good demand in Europe for such belts as we, with our superior leather and skill in working it, can supply at moderate cost.

DOUGLAS PUMPS.

The exhibition of the Douglas Brothers, of Middletown, was a sort of museum of hydraulic apparatus, comprising over three hundred and fifty different sizes and styles of lift and force pumps, for both hand and steam power, garden and fire engines, and hydraulic rams and hydrants with their appliances and fittings. The above were all of the most approved patterns and finish, and were adapted for all climates as well as situations. One of the most gratifying features in the construction of the Douglas pump is the facility with which repairs can be made, owing to the interchangeability of parts. These are made of

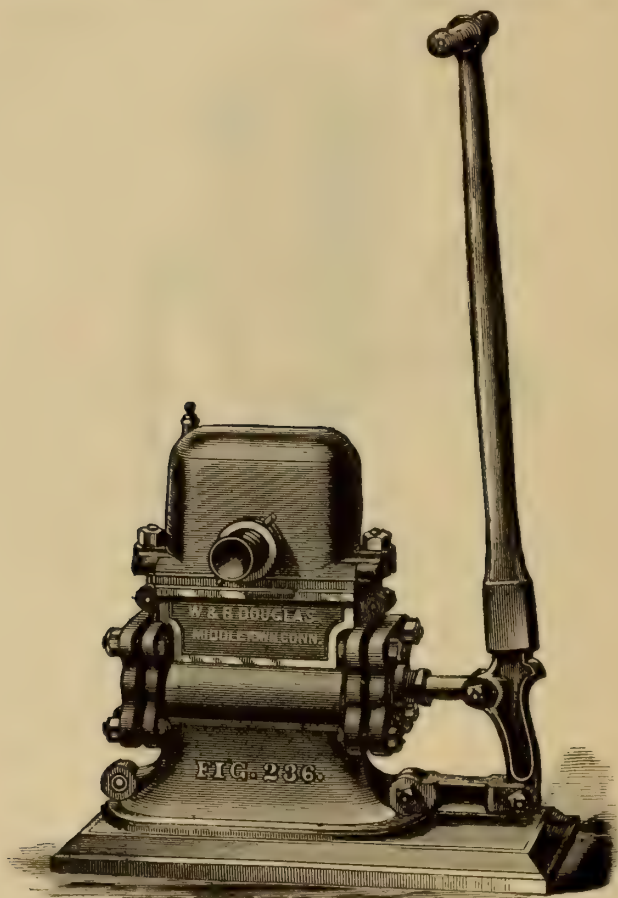
standard forms, showing great care in manufacture and attention to details. On even the smallest and most cheaply constructed pumps, each part is made so carefully that new parts for repairs will always replace and interchange with the old, and make a perfect fit.



Pendulum Pump.

Among the many novelties may be noticed a new kind of house force pump, styled "Pendulum," from the swing of the brake, which being attached to a rocker shaft in the pump,

gives great leverage and ease of working. The pump can readily be converted from force to lift, by simply loosening an air plug, and the working parts are easily removed for repairs. A new style of ship, or deck pump (fig. 236) attracted much



Brass-lined Ship Pump.

attention, from its ease of working and facility of making repairs. This pump is constructed of iron and is most ingeniously lined with brass, so that all the advantages of a brass pump are secured with great saving of cost.

Hydraulic Rams.

Messrs. W. & B. Douglas were also the only exhibitors in the Exposition of a successfully working water-ram. It is strange that, while in France the ram is a philosophical toy, with us, thanks to the Douglas firm, it is an effective and economical water engine of great utility. Although made with great accuracy and high finish of the working parts, anyone can have one of these valuable machines for raising water at small cost, and, if properly set, they need little attention.

Variety of improved Pumps.

Space will not admit of more than a passing notice of their various improved house force pumps, boiler pumps, yard hydrants, and street washer; also a general line of pumps for drive-well use, which were most satisfactorily used in the British Abyssinian Expedition. Should the question be asked—why this enormous variety? the reply is, this house makes goods for all sections of the world, and must meet the tastes as well as the requirements of all nationalities.

Imitations of the Douglas Pump.

The renown of the Douglas pumps leads to many imitations, and instances are known where foreign makers have obtained and placed the real article made in Connecticut on exhibition so as to establish a reputation for their inferior imitations. This is analogous to the Moravian manufacturers' exhibition of Connecticut locks as their own, and the Sheffield makers' production of what they are pleased to call the "Collins axe." But most manufacturers now have the frankness and honesty to say in their catalogues, that their pumps are made after the celebrated Douglas system. The Douglas pump is the *standard* for quality in all markets of the world.

The jury awarded a Silver Medal and a Bronze Medal.

HARTFORD PUMPS.

But before leaving the subject of pumps, mention should be made of the "Hartford automatic pumps," to be worked by wind power or by steam, which received a Bronze Medal.

PICKERING GOVERNORS.

In the same class, also, we find the steam engine governors of T. R. Pickering & Co., of Portland, Conn., which received a Bronze Medal.

GROUP VII.—ALIMENTARY PRODUCTS.

CLASS 69. — CEREALS, FARINACEOUS PRODUCTS AND PRODUCTS DERIVED FROM THEM.

The representation in this Class was made chiefly by the Department of Agriculture of the United States, to which there were several contributors from Connecticut. The State Board of Agriculture, by P. M. Augur, the Secretary, forwarded a selection of oats, corn, rye and beans. Mr. T. S. Gold, of West Cornwall, sent buckwheat, which received the award of Honorable Mention. Mr. G. W. Bradley, of Hamden, sent a remarkable exhibit of Indian Corn, being three stalks, together bearing eighteen perfect ears, the product of three grains, or kernels, of seed. This was raised by Mr. Bradley in Hamden, near New Haven. It was handsomely mounted in a glazed mahogany case and occupied a conspicuous place in the large trophy built in the annex by the Department of Agriculture. The jury of Class 69 gave the award of Honorable Mention.

INDEX.

A

Agricultural Exhibits,	11, 19
Alimentary Products,	96
American Axe, its perfection,	62
Ancient Glass,	23, 24
Ansonia Clock Co.,	39
Anti-friction Latch,	55, 57
Anti-friction Pulleys,	59
Art Castings,	14, 38
Art Museums and Instruction in Art,	22, 26, 27
Art Needle Work, School of	25
Augers, Hollow,	60
Augur, P. M., Secretary,	96
Awards, Number of	5, 20
Axes and Edge Tools, Collins Co.,	61, 66
Axes, various forms of, illustrated,	64
Axles, Rubber Cushioned,	88

B

Barnum, Milo, founder of iron industry,	76
Barnum-Richardson Co.,	75
Barnum, Wm. H., Pres't B. & R. Co.,	77
Bells, Bevin Bros.,	15, 75
Bethnal Green Museum,	24
Bevin Brothers, Bells,	75
Blake Brothers, founders of hardware industry,	49
Blake Crusher Company, New Haven,	89
Blake, Eli Whitney, Rock Breaker,	89
Blast Furnace, first in Connecticut,	77
Book Sewing Machines,	90
Bowie Knives,	62, 68, 69
Bradley, G. W., Indian Corn,	96
Bronze Castings,	56
Buttons,	45

C

Cane Knives,	67, 69
Carpenters' and Cabinet Makers' Tools,	33, 54
Carriage and Cart Wheels,	83
Cartridges,	47
Car Wheel Iron and Car Wheels,	78
Case Brothers, South Manchester,	33
Cast Steel, Collins Company, Hartford,	66
Castellani's Collections,	24
Ceramic Collections,	23
Cereals and Products,	96
Champ levé Enamel,	55
Cheney Brothers, Manchester,	11
Cheviot Shirtings, Slater's Mills,	45
Clocks,	6, 11, 14, 38, 41
Collins & Company, Hartford,	61-72
Collins Axes and Edge Tools,	61
Collins Cast Steel,	66
Collins, Samuel W.,	63
Colt's Fire Arms,	46
Combination Locks, Peters',	73, 74
Connecticut Museum of Industrial Art, Glass for	29
Corn from Hamden,	96
Cotton, Piece Goods,	44
Crusher, Blake Crusher Co.,	89
Cutlery,	14, 61

D

Decorative Rim Locks,	53
Douglas Pumps,	92-95

E

Edge Tools of Collins Co., Hartford,	61
Educational,	11, 13, 26, 32
Embroidery and Sewing Machine Work,	45
Enameled Hardware,	55
Enameled Iron Ware,	91
Exhibitors, Alphabetical List of	6
Exhibitors, List by Classes,	13

F

Fanmakers' Exhibition, London,	26
Flags of Silk from Manchester,	11
Flint Glass, Meriden,	34
Forging the Shaft, Weir's Picture,	30
Furniture,	14, 34
Furniture, at Bethnal Green Museum,	24

G

Gardner Machine Gun,.....	46
Gatling Guns,	18, 45
Giant Lock, Smith & Egge Co.,.....	74
Giant Sash Chain,.....	74
Glass and Glass Ware,.....	14, 23, 24, 29, 34
Glass for the Connecticut Museum of Industrial Art,	29
Gold, T. S., West Cornwall,	96
Granite,	7, 11, 16
Granite, Exhibits of.....	80-83
Granite Enameled Ware,	91

H

Hamden, Indian Corn from.....	96
Hardware,	9, 48
Hartford Pumps,.....	96
Historic Axes,.....	65
Hollow Augers,	60
Hotchkiss Revolving Cannon,	46
Hotel Locks, Mallory, Wheeler & Co.,.....	50
Howell, James & Co., Exhibit of Artistic Clocks,.....	40-43
Hunting Knives,.....	62, 67, 68
Hydraulic Rams, Douglas,	95

I

Imitation of Collins' Axes,.....	71
Indian Corn from Hamden,.....	96
Iron, Barnum-Richardson Co.,	75
Iron Forgings for Decoration,	29
Iron Region of Salisbury,	76
Iron Ware, Enameled,	91

J

Jewell & Sons, Hartford, Leather Belting,.....	92
--	----

L

Laboratory Crusher, Blake's,	90
Lalance & Grosjean,	92
Leather and Skins,	16, 92
Leather Belting,	92
Lewis Brothers' Exhibit of Cottons,	44
Lewis, Henry G., Pres't Wheel Co.,.....	83
Lime Rock Iron Forge,	76
Littlejohn, Elliott,.....	50
Locks,	48
Locks and Bolts, Artistic,	29

M

Machetes, Cane Knives, &c.,	67, 69
Maize (Indian Corn),	7, 19
Mallory, Wheeler & Co.,	50
Managers, Connecticut Board of	4
Manchester Museum,	25
Manning & Bowman, Nickel Mountings,	91, 92
McCurdy, C. J., Rose Granite,	82
Melodeon,	37
Meriden Flint Glass Works,	34
Meriden Britannia Company, Glass for Museum,	29
Miller's Patent Axle,	89
Mine Hill Granite, Roxbury,	82
Mining and Quarrying,	11, 15, 16
Mining Industries and Products,	48
Mining Tools, Picks, &c., Collins Co.,	61, 69
Mower, E. Exhibitor of Granite,	82
Museums, Influence of	21
European Museums,	26
Paris Museum,	27
Musical Instruments,	14

N

Needle Work, Artistic,	25
New England Granite Company,	80
New Haven Wheel Company,	83-88
Night Lamp Clock,	39
Northfield Knife Company,	35
Nottingham Castle Museum,	25
Number of Exhibitors,	5

O

Oil Paintings,	13, 30, 31
Organs, B. Shoninger & Co.,	9, 35

P

Padlocks, Exhibit of	52
Paintings,	13, 30
Paper,	13, 33
Parker's Treasury Blotting Paper,	33
Portland Vase,	24
Pendulum Pump,	93
Peter's Combination Lock Co.,	73
Pickering, Thos. R., Governors,	96
Picks for Mining and Excavating,	69, 70
Ponemah Mills, Taftville,	45
Porphyritic Granite, Lyme,	82

Postal Bureau, Yale Mfg. Co.,	72
Post Office Locks and Boxes, Yale Mfg. Co.,	73
Pratt, Whitney & Co.,	46
Pulleys, Anti-friction,	59
Pumps and Hydraulic Apparatus, Douglas,	8, 92-95

Q

Queen Anne Clocks,	40, 43
--------------------------	--------

R

Red Granite, Stony Creek,	81
Red Granite, Lyme,	82
Reproductions of Ancient Glass,	23, 24
Reversible Door Latches,	51
Revolving Cannon,	46
Rifles,	15, 46
Rim Locks, French,	49
Rim Locks, American,	53
Rock Breakers, Blake's Patent,	89
Roman Glass, reproduced,	23
Rose Porphyritic Granite,	82
Rubber Cushioned Axles,	88
Rules and Levels,	33
Russell & Erwin Mfg. Co.,	54
Russell's Reversible Latches,	56

S

Salisbury Iron Ores and Iron,	75
Salisbury Iron Region. Map of	76
Salisbury, First Blast Furnace,	77
Sarven Patent Wheel,	83-88
Sash Chains, Smith & Egge Co.,	74
Scrap Book, Mark Twain's,	32
Screws, Russell & Erwin Mfg. Co.,	54, 55
Seth Thomas Clock Co.,	38
Seward & Sons, Carriage Hardware,	89
Sewing Machines,	15, 90
Sharp's Rifles,	46
Ship Pumps,	94
Shoninger B., Organ Co.,	35
Silk,	11
Sleigh Bells, Bevin Bros.,	75
Smith & Egge Mfg. Co.,	74
Smith, F. W., Smith & Egge Co.,	74
South Kensington Museum,	22, 23
Springs for Locks,	49
Stanley Rule and Level Co.,	33

Steam Engine Governors,	96
Steel Door Keys,	58
Stevens. J. E., Company, Toys,	47
St. Louis Stamping Company,	91

T

Technical Education,	26
Textile Fabrics,	11, 15
Thread, Willimantic,	15, 43
Time Locks, Yale Mfg. Co.,	73
Towne, H. R., Yale Locks,	72
Toys, Stevens Company,	47
Trocadéro Exhibit of Axes,	65

U

Union Metallic Cartridge Co.,	47
-------------------------------------	----

V

Visitors, Number of, at Successive Exhibitions,	21
---	----

W

Waterbury Button Co.,	45
Waverly Mills, Burnside,	33
Westerly Granite,	80, 81
Willimantic Linen Co.,	43
Willimantic Thread,	15, 45
Wheeler & Wilson Mfg. Company,	90
Wheels for Carriages and other Vehicles,	18
Wood Finish,	90
Wood Screws, Russell & Erwin Mfg. Co.,	54
Woolworth & Graham,	33

Y

Yale Lock Mfg. Co.,	82
Yale Postal Bureau,	72
Yankee Axe, Collins & Co.,	62, 63
York Museum,	25



LUNATIC ASYLUM, MIDDLEBURY, VERMONT.

Page 53 of 54

FIFTEENTH REPORT

OF THE

Board of Trustees

OF THE

Connecticut Hospital for the Insane

FOR THE

STATE OF CONNECTICUT,

WITH

SUPERINTENDENT'S AND TREASURER'S REPORTS;

Presented to the General Assembly at its Session in January, 1881.

By Order of the General Assembly.

MIDDLETOWN, CONN.:

Pelton & King, Steam Printers and Bookbinders,
1881.

OFFICERS OF THE HOSPITAL.

BOARD OF TRUSTEES.

CHARLES B. ANDREWS,	-	-	-	-	-	LITCHFIELD.
H. SIDNEY HAYDEN,	-	-	-	-	-	- WINDSOR.
LUCIUS S. FULLER,	-	-	-	-	-	- TOLLAND.
SAMUEL G. WILLARD,	-	-	-	-	-	COLCHESTER.
RICHMOND M. BULLOCK,	-	-	-	-	-	- PUTNAM.
RICHARD S. FELLOWES,	-	-	-	-	-	NEW HAVEN.
HENRY WOODWARD,	-	-	-	-	-	MIDDLETOWN.
ROBBINS BATTELL,	-	-	-	-	-	- NORFOLK.
EZRA P. BENNETT, M. D.,	-	-	-	-	-	- DANBURY.
JOSEPH W. ALSOP, M. D.,	-	-	-	-	-	MIDDLETOWN.
E. B. NYE, M. D.,	-	-	-	-	-	MIDDLETOWN.
BENJAMIN DOUGLAS,	-	-	-	-	-	MIDDLETOWN.

M. B. COPELAND, MIDDLETOWN, - - - - - *Treasurer.*

RESIDENT OFFICERS.

ABRAM MARVIN SHEW, M. D.,	<i>Superintendent and Physician.</i>
JAMES OLMSTEAD, M. D., - -	<i>First Assistant Physician.</i>
WILLIAM E. FISHER, M. D., - -	<i>Second Assistant Physician.</i>
CHAS. E. STANLEY, M. D., - -	<i>Third Assistant Physician.</i>
J. W. THAYER, - - - - -	<i>Clerk.</i>
CLINTON W. WEATHERBEE, - - - - -	<i>Farmer.</i>
MRS. MARGARET DUTTON, - - - - -	<i>Matron.</i>
MRS. M. A. WEATHERBEE, - - - - -	<i>Assistant Matron.</i>

All communications relative to the admission, etc., of Patients should be addressed to the Superintendent. Blanks will be furnished on application.

Trustees' Report.

To the General Assembly of the
State of Connecticut:

THE TRUSTEES OF THE CONNECTICUT HOSPITAL FOR THE INSANE have the honor to present herewith their Fifteenth Annual Report, with the Reports of the Superintendent, and Treasurer, &c.

Your attention is respectfully invited to that part of the Superintendent's Report which alludes to the new buildings and additions in connection with the existing annex hospital, as well as to the alterations and improvements which are rendered needful by the extension of the annex hospital and consequent increase of the number of the patients. You will observe that changes are necessitated for the supply of food from increased population, as well as for laundry and workshop accommodations, and for adequate protection from fire.

You are, therefore, asked for an appropriation of \$10,000, our first application for several years, viz. :

\$3,000 for protection from fire (outside of buildings).

\$3,000 for purchases of additional cows, and erection of a barn for them.

\$2,000 for needed workshops.

\$2,000 for additional laundry apparatus.

As detailed in Superintendent's paper.

The total number of patients who have been treated during the year has been 654. Number remaining 30th Nov., 1880, 528, of which were 251 men, and 277 women. Total of deaths for the year, 30.

General health has prevailed, and the deaths have occurred from maladies usual to the hospital, in which it is ever the same painful story of diseases of that delicate and easily deranged part of the human system—the brain,—diseases proceeding from the many varying conditions of men's lives: neglect of ordinary sanitary laws of living; indulgence of passions; overwork. The well-known disappointments, and harassments of commercial, professional, religious and domestic conditions are all constant factors in producing insanity, even when hereditary predisposition is not taken into account.

There come to your hospital, from time to time, very sad instances of mental decay, which are a lesson to us who have to know about them. Melancholy, indeed, is it to see a decline from professional activity and prosperity; from some eminent position in the scientific world as a respected teacher; a fall, with loss of intellect, which brings a poor, imbecile old man the inmate of your walls, without whose protection he would soon pass, in helpless misery, to a miserable death, while, by your bounty, his declining days are succored in cleanliness and with provident care.

Temporary accommodations have been recently made in separate buildings for 20 women and for 30 men. Those most unlikely to give trouble have been moved to these buildings, making room in the hospital proper for new cases immediately needing medical care.

In addition to these, there are applications for admission of 80, sixty of which number are for men.

We wait with deep interest the delivery to your Board of the new hospital now in course of construction, under the care of the State Committee appointed by the Governor.

The terms of service as Trustees of the members from Hartford and Tolland Counties expire at this time. Their reappointment is respectfully asked.

Respectfully submitted,

CHARLES B. ANDREWS,	Litchfield.
H. SIDNEY HAYDEN,	Windsor.
LUCIUS S. FULLER,	Tolland.
SAMUEL G. WILLARD,	Colchester.
RICHMOND M. BULLOCK,	Putnam.
RICHARD S. FELLOWES,	New Haven.
HENRY WOODWARD,	Middletown.
ROBBINS BATTELL,	Norfolk.
EZRA P. BENNETT, M. D.,	Danbury.
JOSEPH W. ALSOP, M. D.,	Middletown.
E. B. NYE, M. D.,	Middletown.
BENJAMIN DOUGLAS,	Middletown.

Superintendent's Report.

To the Board of Trustees of the

Connecticut Hospital for the Insane:

GENTLEMEN—This Fifteenth Report covers the fiscal year commencing December 1st, 1879, and closing November 30th, 1880.

The period has been one of quiet, active labor, free from exciting incidents, pestilence or unusual sickness. When measured by the number of changes in the population, and the character of cases presented for treatment, it shows progress in legitimate hospital work.

There were, at the commencement of the year, five hundred and ten patients. Applications were made for the admission of three hundred and seven. Only one hundred and forty-four of these could be admitted for want of room. The number received would have been much less than reported, but for our practice of returning to friends or placing out all who could be so disposed of without disadvantage to themselves. This custom reduces the list of those reported *Recovered*, and swells the list of those reported *Improved*. Candor compels us to tabulate as simply improved, many persons who would be reported as fully restored to health if they could have remained a short time longer. Such instances come to my notice where the subsequent history shows firm mental health.

The following table exhibits in condensed form the movements of the population:

		Males.	Females.	Total.
No. at the beginning of the year,	-	246	264	510
Admitted in the year, -	-	73	71	144
Total present in the year, -	-	319	335	654
Discharged—Recovered, -	-	11	19	30
Improved, -	-	15	14	29
Stationary, -	-	26	11	37
Died, -	-	16	14	30
Remaining at the end of the year,	-	251	277	528
Average present during the year,	-	250.68	263.95	514.63

Six hundred and fifty persons received treatment during the year. The number of admissions—one hundred and forty-four—represents so many different individuals. No person is admitted or discharged more than once during the official year. Thirty persons were discharged fully restored to health. Twenty-five of these were recoveries from a first attack; four from a second, and one from a fifth. It is reasonable to expect that some of the thirty may again require hospital care.

Nearly all of the twenty-nine reported *Improved*, when discharged, were hopeful cases, with such evidences of mental stability as to warrant their being sent home "on trial," to make room for more urgent cases. Occasionally one of these is returned, but generally the trial results in their remaining at home.

Three male patients were discharged as not insane. One of these came from Wetherfield Prison; another was sent to the Hospital by the Hartford Police Court, and the third was simply an inebriate who remained until the alcohol had evaporated.

Thirty-four quiet chronic cases were removed by town officials to make room for more urgent ones. The custom is justifiable by reason of the claim which recent cases have to early treatment. But it is none the less depressing to witness the return of demented and often helpless invalids to the ordinary almshouse. It will be a source of gratification to be able to retain all such cases as soon as the new buildings are completed. The usefulness of a hospital is shown as much in taking proper care of the chronic and often helpless lunatics, as in the cure of the few acute cases which find entrance. The record is, perhaps, less brilliant, but none the less important, in the estimation of Christian philanthropists.

I have already referred to the prevalence of general good health. The number of deaths was thirty, or 5.82 per cent. of the total number under treatment. Only once—the year immediately preceding this, which was exceptionally low—have I been able to report so small a death rate. Ten of the thirty were more than sixty years old, and five had passed beyond the allotted period of life. One female, aged sixty, was brought to the Hospital in a dying condition, too feeble to raise her head from the pillow, and the left lower limb covered with gangrenous sloughs. Death came as a blessed relief on the third day.

Another, aged forty, was kept alive three days by the liberal use of stimulants. Why the authorities should have taken the responsibility of moving either of these patients, in their extremely

exhausted condition, is beyond my comprehension. Death was caused by apoplexy in three; by epileptic convulsions in three; by pulmonary consumption in three; by Bright's disease of the kidneys in two; by cardiac thrombosis in one; by aneurism of the internal carotid artery in one; by cerebral softening in one; by general paralysis in one; by senile decay in three, and by acute mania in one. The average age of all who died was 48.46 years. Deaths occurred in months as follows:

In December 4, in January 2, in February 2, in March 0, in April 0, in May 3, in June 4, in July 3, in August 5, in September 2, in October 2, and in November 3. The following table shows the number of deaths each year, the percentage of the whole number, and of the average number present:

DEATHS AND THEIR RATIOS, FROM MAY 1ST, 1868, TO NOV. 30TH, 1880.

Official Year.	Whole Number of Patients.	Daily Average No. of Patients.	DEATHS.			Per Cent on Whole No. of Patients.	Per Cent on Daily Average No. of Patients.
			Men.	Women.	Total.		
1868-69,	268	85.47	14	1	15	5.59	17.57
1869-70,	343	225.17	18	3	21	6.12	9.32
1870-71,	307	237.	11	10	21	6.71	8.86
1871-72,	329	242.58	9	6	15	4.55	6.18
1872-73,	336	264.53	12	9	21	6.25	7.86
1873-74,	524	239.51	18	17	35	6.67	10.30
1874-75,	605	425.80	21	15	36	5.95	8.45
1875-76,	616	452.64	26	7	33	5.35	7.31
1876, 8 mos	548	456.97	9	6	15	2.73	3.28
Dec. 1, '76,							
Nov. 30, '77	619	463.88	19	12	31	5.01	6.69
1877-78,	629	474.17	27	13	40	6.36	8.43
1878-79,	644	498.34	9	10	19	2.95	3.81
1879-80,	654	514.63	16	14	30	4.58	5.82

The average number of patients present during the year was a fraction less than five hundred and fifteen—seventeen more than during the next preceding year.

Your attention is called to tables IX. and X., which show by whose order patients are admitted. One hundred and twenty-three, were sent by order of Judges of Probate Courts; eight by Judges of

the Superior Court; four by Judges of the Police Courts; eight by order of His Excellency Governor Andrews, and one by bonds furnished by friends.

Table X. shows how they were supported, viz.: eighty-eight by the State and towns, (paupers); forty by the State and friends, (indigents); fifteen by the State alone, and one by friends. At this date five hundred and twenty-six of the five hundred and twenty-eight patients are chargeable to the State and towns. Only two are supported entirely by friends. It thus appears that the Institution is providing for the charitable patients, while those who have means must seek accommodations elsewhere. While a State hospital should always give preference to the poor, strict enforcement of the rule excluding all paying patients does injustice to many worthy persons of limited means, who would rather make great personal sacrifices and pay the entire expense—four dollars per week—than to apply for assistance to the town or State. I trust that when the new buildings are opened, all distinctions as to *class* may be removed.

It has been said that statistics are not reliable as a basis from which to deduce general truths. This may be true respecting some forms of deductions, but it does not hold true respecting all.

For instance, table IV. in the appendix, gives the age at which 1,914 patients became insane. A study of this table proves that insanity is, pre-eminently, a disease of middle life.

Thirteen hundred and thirteen, about three-fourths of the whole number, became insane between twenty and fifty years of age. It is during the period of greatest domestic activity and business enterprise, when the intellectual faculties and the emotions are most powerfully and continuously excited, that the human mind becomes deranged. Now, if death or recovery followed speedily as in other diseases, the State would not be called upon to provide for insane persons. But, unfortunately, insanity is a disease which tends to chronicity. In other words, after the acute stage has been passed, insanity tends to prolong life, and its subjects not only cease to be producers but become consumers during a long period of time. You observe in table XXVI. that nearly one half of the 528 patients remaining at the end of the year, were over fifty years of age. Many of these have been inmates of the Institution since its opening, thirteen years ago, and they show fewer evidences of the flight of time and the approach of age, than do those who have had the laborious care of them.

A careful study of this aspect of insanity has led to the conclusion

that the prevalent notion respecting the rapid increase of mental diseases is at least questionable. Two facts should be remembered when considering this subject: Population is rapidly increasing, and the care and treatment of insane persons is so much more humane than formerly, that their life is measurably prolonged. Society, by its benevolent care, is providing for this accumulation. It can be shown by actual records that the proportion of new or recent cases occurring in this State during the past year, bears about the same relation to the total population, as did the number of new cases to the population twenty years ago. The apparent increase is developed by the generosity of the State in providing for five hundred of its wards, who were then scattered about the State in numerous almshouses. There has been a steadily increasing tendency on the part of public officials and the friends of the insane to place them under hospital treatment. Of the numerous cases classed under the heads of chronic melancholia, epilepsy, histero-epilepsy, and imbecility, now sent to hospitals, not one in ten was thus provided for twenty years ago. All of these facts should be remembered when considering the question of apparent increase.

How to properly provide for this large dependent class is a question of greatest moment. Differences of opinion exist among experienced alienists. Many still maintain that expensive hospitals should be erected to accommodate all, irrespective of class or condition. Without attempting to discuss this question at length, I would suggest that extreme views are generally untenable, and that a solution of the problem may be found in following a medium course.

Such a plan is being pursued in New York State, at Ovid. The success of the experiment at the Willard Asylum, of erecting plain but substantial supplemental buildings, on the grounds near to the main asylum, led the Commissioners in this State to recommend a similar plan which is now being carried out. At a short distance from the central hospital there is being erected a group of brick buildings in which provision will be made for 262 of the more quiet chronic patients, who require little medical attention. In general, the plan contemplates receiving and treating all acute and all turbulent cases in the hospital proper; from time to time the quiet chronic patients will be transferred to the new buildings, where good custodial care can be maintained at less expense. The plan has worked so well at Willard, that it seems to be the best solution yet proposed of this most troublesome problem.

To facilitate the early reception of some of those patients who

were waiting, we have recently remodeled and furnished a farm house, situated one-half mile to the rear of the hospital, which affords good accommodations for twenty quiet female patients. This makes the third "cottage" in use. Two have served a good purpose during the past ten years. All of these are plain farm houses, heated by stoves and lighted by ordinary lamps. The doors are *unlocked* and windows *unguarded*, except by the ordinary green blinds, which were on the houses when used by *sane* families.

I mention this merely as a matter of record, in view of the fact that so much is being said about the "uselessness of bars and bolts." We have for ten years treated insane patients in two "open" cottages. To reason from this that all patients could be thus cared for would be illogical. It should be remembered that these patients are selected from five hundred, on account of their quiet, harmless condition.

If all deranged persons were of this class, *and had homes*, the State would not be called upon to provide for them. Unfortunately, a majority of insane persons are more or less turbulent and unmanageable at home; hence, they require the restriction of liberty which a hospital affords. Their own welfare demands it no less than the claims of society. The wise provision which is here made for their security, permits a much larger amount of personal liberty than could possibly be allowed at home.

In this connection I may be pardoned for repeating a fact, which has been referred to in former reports, that mechanical restraint is used at this Institution, only by direction of the physician, to prevent serious accidents.

A record of the name, cause, and duration is carefully kept. This record shows that less than one per cent. are in any way restrained or secluded. Periods of several weeks pass without the necessity for using any restraining apparatus, and then, perhaps, we will have a half dozen patients all at one time who require it.

Under authority of the Finance Committee, I have taken the Silver Mine Farm for a period of five years, at \$100 per year, and am now furnishing the large boarding house to receive thirty quiet males. This, with the farm house and the two cottages, will make four "cottages," in which we can treat seventy-eight quiet patients. The land at the Silver Mine Farm is valuable only as additional pasturage.

Since your last annual meeting, the annex has been devoted to the object for which it was prepared; namely, to provide for the insane convicts and the criminal insane. It has 24 single rooms, two day

rooms, a dining room, three bath rooms, closets, and the necessary store rooms. It is situated 250 feet to the rear of the main hospital; is heated by steam and lighted by gas. Three attendants are always in charge. Since last March eleven male convicts have been transferred from the Wethersfield Prison. Nearly all of these have been kept at work about the grounds during the summer months. Two, whose terms of sentence had expired, have recovered, and another one has been returned to the prison as "not insane."

In my last annual report I mentioned the completion of an additional reservoir, covering two and one-half acres. The severe drought of the past summer and the use of a large amount of water in the erection of the new hospital, has tested the supply and shown the wisdom of having an additional reservoir. Without it we should have exhausted the main reservoir. With it we were able to use water everywhere freely and continuously.

While on this subject, permit me to again direct your attention to the importance of having greater facilities for extinguishing fire by means of out-door hydrants. Your building is well planned and protected so far as the internal arrangements are concerned; brick walls extend from foundation to roof, in the corridors, halls, stairways and rooms; all ventilating flues are carried in brick out of the roof as separate chimneys; floors are everywhere deafened by two inches of mortar; iron doors separate the wards; one hundred and fifty feet of water hose is ready for use in every ward, and nearly two hundred pails of water stand ready on all landings and space ways; several fire extinguishers are placed at convenient points about the building. But the recent terrible catastrophe at the Minnesota Hospital for the Insane, in which many lives were lost, shows the importance of having ample provision made for outside protection.

A line of six-inch water pipe should extend around the Hospital, with at least twenty-four hydrants placed at equi-distant points.

As the water supply is abundant, it would only be necessary to connect the new reservoir with the main water pipe at the old, to give at all times one hundred and fifty feet head. This pressure would throw several streams of water over the highest point of the center building. The estimated expense for pipe, hydrants and hose is \$2,150.

You have wisely maintained insurance on the Hospital buildings to the amount of about \$200,000. This involves an annual expense of \$500, which has thus far been paid out of current receipts. As the institution receives no income other than that derived from the

board of patients, should so large an amount be diverted for insurance? Should not the subject be brought to the attention of the General Assembly, and have it definitely decided whether the State will insure its own buildings, or continue the present system?

IMPROVEMENTS.—When it was decided to locate the new Hospital on the grounds south of the present buildings, it became necessary to remove the fruit trees and shrubbery to a new garden spot. This work, involving some expense, was done mainly by the labor of convalescent and quiet chronic patients.

Early in the season a new arbor was erected on the lawn near the north highway, for the accommodation of the female patients. It is built of cedar, one hundred and twenty feet in length, twenty-four feet in width, separated into nine sections, with seats for one hundred and fifty persons. At the west end is an elevated band stand, and near at hand four large, self-acting wooden swings. Here many of our patients have passed the summer evenings pleasantly, while listening to the Hospital band.

Improvements in grading, laying of walks and road building have continued. A large permanent horse barn was erected. It will thus be seen that the plan heretofore pursued of maintaining the Hospital in a healthy state of repair, together with needed improvements, has been continued during the past year.

In view of the increase of numbers by at least two hundred and fifty patients in the new Hospital, it will become necessary to add twenty-five cows to the live stock and to erect another farm barn for their protection. This will necessitate an appropriation of \$3,000.

Year by year we are able to employ more inmates on the farm and about the domestic labors of the house. The daily ward reports show that sixty per cent of all are employed during the summer, and forty-five per cent during the winter. The Farmer's Report, herewith presented, shows a steady increase of annual products as one of the results, and the quietness of the wards and general good health of the patients another and more important outgrowth of employment. The erection of a few large, plain shops would enable us to continue during the winter the employment of many who are now idle. For this purpose an appropriation of \$2,000 could be profitably invested.

During the autumn months, under your instruction, I have had erected a new laundry building of sufficient dimensions to provide for the largely increased laundry work. It will be necessary to purchase four new washing machines, pulleys, belts, shafting and fixtures, at an expense of \$2,000. When these are in place, work can

go on in the new laundry while the old apparatus is being moved. The extent and importance of this branch of work is understood when it is remembered that the average number of garments passing through the laundry weekly is now 10,000, and will increase to 15,000 when the new Hospital is in full operation. Valuable assistance is rendered by thirty patients in washing, ironing and handling.

Following the custom of former years, we have continued and extended the methods employed to entertain our patients. During the summer the Hospital brass band played every pleasant morning at the south arbor, while such of the male patients as were judged incompetent, by reason of disease, age or circumstances, to labor, were being exercised in military evolutions, or were quietly enjoying themselves in the shade of the arbor. Thus it would often happen that the wards were deserted, not a male patient remaining in the building for hours in succession. When you remember that those who labored were often at work one mile distant from the house, and the others about the grounds with open gates, it may seem strange that only one patient eloped. There were occasional attempts; but these attempts were less frequent than in former years when we made use of the inclosed airing courts. When the weather permitted, on every Tuesday and Friday evenings, the band has given an out-door concert at the ladies' arbor. Other entertainments were provided in the Amusement Hall and in the Chapel during the winter season, as follows:

Sociable, with music and dancing,	-	-	-	13	evenings.
Masquerade Party,	-	-	-	-	1 "
Lectures with Stereopticon,	-	-	-	-	12 "
Variety Entertainment,—Hospital Troupe,	-	-	-	1	"
Comedy and Farces,—Hospital Troupe,	-	-	-	2	"
Minstrels,—Hospital Troupe,	-	-	-	-	1 "
Old Folks' Concert,	-	-	-	-	1 "
Dickens' Party,	-	-	-	-	1 "
Legerdemain,—E. A. Parsons,	-	-	-	-	1 "
Lectures—Trip to Lake Superior.	Prof. W. O.				
Atwater,	-	-	-	-	1 "
" London.	Prof. Winchester,	-	-	1	"
" California.	D. W. C. Skilton,	-	-	1	"
" St. Patrick.	Rev. Dr. Coit,	-	-	1	"
" England.	Rev. J. S. Bayne,	-	-	1	"
" Egypt.	Rev. C. A. Buck,	-	-	1	"

Minstrels,—Hartford Retreat Troupe,	-	-	-	-	1	evenings.
Readings,—D. G. Lawson,	-	-	-	-	3	"
" Miss Georgia Cayvan,	-	-	-	-	1	"
" Miss Annie C. Walter,	-	-	-	-	1	"
Legerdemain,—Prof. Pray,	-	-	-	-	1	"
Concert,—Misses Spencer and Wilcox, Mr. Pearne						
and Mr. Hatch,	-	-	-	-	1	"
Band Concerts, -	-	-	-	-	32	"

On Saturday, August 21st, three hundred patients, officers and attendants enjoyed an excursion to the sea shore. The trip down the river was made in a large barge, fitted for the occasion with awning over the entire deck, and seats to accommodate all. A steam tug furnished motive power. A pleasant sail of three hours to Fenwick Grove, at Saybrook, gave us all good appetites for the "sea shore" dinner which had been provided. Another hour was spent in dancing and swinging before embarking for home. The return trip up the river by moonlight was greatly enjoyed, notwithstanding the warm showers which occasionally passed over the river. The Hospital band furnished music for the entire day.

Nothing occurred to mar the pleasures of the occasion. At eleven o'clock all were quietly sleeping in their little beds, and for the third time an excursion, unique in character, heretofore considered impracticable, had terminated without cause for alarm, and with only recollections of a most enjoyable summer's day. Other excursions of walking parties were made to the neighboring hills, and at all times a number of patients have had unlimited parole to go to the city and about the country.

Financial Statement.

For the information of the public, it is proper that I should make a brief statement respecting the manner in which the Hospital is supported. Many persons suppose that we can draw from the Treasury, because the Hospital is owned and controlled by the State. This erroneous impression causes us embarrassment in the collection of bills. It should be understood that the Hospital has no other income than that derived from the board of patients. It has not in its thirteen years' existence received an appropriation for running expenses, repairs or improvements. But at the present price of board, (four dollars per week), and cost of provisions, it is only possible to keep our patients well and make the necessary repairs. Needed improve-

ments heretofore mentioned must be provided for by an appropriation. The total revenue during the past year was \$114,438.94. The total expenditures were \$114,155.75. This includes \$4,789.96 for construction of new buildings. The abstract on pages 40-41 give a classified list of all expenditures.

To recapitulate, we need an appropriation of \$10,000, as follows :

For protection from fire, - - - - -	\$3,000
Twenty-five cows and farm barn, - - - - -	3,000
Work shops, - - - - -	2,000
Laundry apparatus, - - - - -	2,000
Total, - - - - -	<hr/> \$10,000

Acknowledgments.

As in former years, many friends have shown an interest in our work by donating books, magazines and papers, and by assistance in our entertainments. Among these were the choir and young people of the South Congregational Church of Middletown, in an "Old Folks' Concert" and a "Dickens' Party;" Professor W. O. Atwater in a lecture; Professor Winchester in a lecture; the officers and attendants of the Hartford Retreat in a vocal and instrumental concert; D. W. C. Skilton in a lecture; Dr. Coit, Rev. J. S. Bayne and Rev. C. H. Buck in lectures; the Misses Spencer and Wilcox and Messrs. Pearne and Hatch in a concert; Dr. Alsop in a cannon of historical interest, 12 vols. *Littell's Living Age* and other magazines; Mrs. E. B. Monroe in several packages of books and magazines; Mrs. Ward in a carriage; A. R. Parshley in a dozen Brahma hens' eggs; Senator Platt in one vol. Med. and Surg., History of the War; L. R. Hazen in papers, magazines, etc.; Miss C. Waite in a Worcester's Dictionary; Charles Scribners' Sons in half discount on Encyclopædia Britannica; Herbert W. Ward in a night-blooming cactus; Capt. C. F. Buell in a collection of shells; S. C. Hastings, subscription to *Good Literature*, and to the publishers of the State Papers for gratuitous copies.

Personal Changes.

In May last Mr. Frank B. Weeks resigned the position of Clerk, which he had faithfully and creditably filled for a period of eight years, to engage in private business.

A simple record of his labors shows an amount of work performed

and an exactness and perfectness of details in the record books that reflects great credit and shows rare qualifications for the office.

The strictly professional administration remains the same as during the past three years. All of the officers deserve honorable mention and recognition, in their several positions, for their fidelity and efficiency.

In conclusion, accept an expression of my gratitude for your wise counsels and valuable aid in the management of the public charity entrusted to our common care.

Respectfully submitted.

A. MARVIN SHEW, M. D.,

Superintendent.

MIDDLETOWN, CONN., Dec. 1, 1880.

Farmer's Report.

To the Superintendent:

Again it becomes my pleasure to render to you my Annual Farm Report.

Quantity and Value of Products.

Hay, - - -	118 $\frac{3}{10}$ tons, -	\$2,366 00
Corn Fodder, - -	26 $\frac{1}{2}$ " -	397 50
Straw, - - -	17 " -	255 00
Oats, - - -	198 bushels, -	83 16
Rye, - - -	259 " -	208 89
Potatoes, - - -	1,569 $\frac{1}{2}$ " -	1,177 12
Carrots, - - -	208 " -	72 80
Beets, - - -	95 $\frac{1}{2}$ " -	38 20
Spinach, - - -	66 " -	46 20
Beet Greens, - -	99 " -	59 40
Beet Mangold-Wurzels,	114 " -	45 60
Onions, - - -	185 $\frac{1}{2}$ " -	185 50
Turnips, - - -	256 " -	64 00
Beans, (String) -	103 " -	103 00
Beans, Pole, (in Shell)	118 $\frac{1}{4}$ " -	147 81
Peas, (in Shell) -	61 " -	97 60
Parsnips, - - -	100 " -	45 00
Sweet Corn, - -	312 " -	171 60
Cucumbers, - -	105 $\frac{1}{2}$ " -	79 12
Tomatoes, - -	111 $\frac{1}{2}$ " -	66 90
Summer Squash, -	99 " -	74 25
Winter Squash, (Hub'rd)	6,660 pounds, -	133 20
Lettuce, - - -	553 heads, -	16 59
Pie Plant, - - -	760 pounds, -	15 20
Melons, - - -	21,372 " -	427 44

Cabbages,	-	-	4,000	heads,	-	\$240 00
Radishes,	-	-	4 $\frac{1}{2}$	bushels,	-	4 50
Cauliflower,	-	-	200	heads,	-	30 00
Celery,	-	-	2,500	"	-	100 00
Asparagus,	-	-	132 $\frac{1}{2}$	pounds,	-	14 58
Strawberries,	-	-	1,770	quarts,	-	269 56
Blackberries,	-	-	4	bushels,	-	10 24
Cherries,	-	-	1	"	-	2 50
Currants,	-	-	3 $\frac{1}{4}$	"	-	6 87
Pears,	-	-	2	"	-	2 00
Apples,	-	-	194	barrels,	-	133 07
Cider,	-	-	67	"	-	167 50
Milk, (grass fed)	-	-	470,88	quarts,	-	2,354 40
Beef,	-	-	3,625	pounds,	-	240 38
Veal,	-	-	970 $\frac{1}{2}$	"	-	88 20
Heads and Plucks,	-	-	12		-	3 00
Pork,	-	-	14,854	"	-	1,039 78
Pigs, (sold)	-	-	56		-	179 50
Calves, (sold)	-	-	8		-	12 50
Calf Skins, (sold)	-	-	12		-	14 50
Chickens,	-	-	330 $\frac{1}{2}$	"	-	52 88
Pigeons,	-	-	5	dozen,	-	12 50
Eggs,	-	-	422 $\frac{1}{4}$	"	-	88 02
Field Corn, (on ear)	-	-	1,074	bushels,	-	483 75
Broom Brush,	-	-	1,500	pounds,	-	75 00
Total,	-	-	-	-	-	\$12,002 31

WEIGHT OF EACH HOG KILLED.—492, 449, 377, 445, 451, 472, 381, 467, 383, 400, 411, 463, 397, 416, 480, 485, 543, 459, 398, 448, 422, 460, 561, 416, 625, 490, 565, 421, 486, 397, 340, 470, 382. Total weight, 14,854 pounds. Average weight, 450 $\frac{1}{8}$ pounds.

The farm stock at the present time consists of five horses, six working oxen, one bull, six fat cattle, forty cows, two two years old, five yearlings, two calves, four boars, thirty-one breeding sows, twenty-three fat hogs, thirty-two shotes, one hundred hens.

Respectfully submitted,

C. W. WETHERBEE,

Farmer.

TABLE I.

MOVEMENT OF THE POPULATION.

	Males.	Females.	Total.
Number at the beginning of the year, -	246	264	510
Admitted in the year, - - -	73	71	144
Total present in the year, - - -	319	335	654
Discharged,—Recovered, - - -	11	19	30
Improved, - - -	15	14	29
Stationary, - - -	26	11	37
Died, - - -	16	14	30
Remaining at the end of the year,	251	277	528
Average present during the year, - -	250.68	263.95	514.63

TABLE II.

ADMISSIONS AND DISCHARGES FROM THE BEGINNING OF THE HOSPITAL.

	Males.	Females.	Total.
Admitted, - - - - -	1114	867	1981
Discharged,—Recovered, - - - -	245	160	405
Improved, - - - -	205	164	369
Stationary, - - - -	203	143	346
Died, - - - - -	209	123	332

Average Number Present Each Year from the Beginning.

Years.	Males.	Females.	Total.
1868-69, - - - - -	79.35	6.12	85.47
1869-70, - - - - -	110.63	114.54	225.17
1870-71, - - - - -	115.97	117.72	233.69
1871-72, - - - - -	124.21	118.44	242.65
1872-73, - - - - -	132.11	132.43	264.54
1873-74, - - - - -	146.43	193.29	339.72
1874-75, - - - - -	198.54	227.19	425.73
1875-76, - - - - -	225.60	227.02	452.62
1876—April 1st to Nov. 30th, - - -	228.39	228.58	456.97
1876-77, - - - - -	231.45	232.43	463.88
1877-78, - - - - -	236.11	238.06	474.17
1878-79, - - - - -	244.57	253.76	498.34
1879-80, - - - - -	250.68	263.95	514.63

TABLE III.

NUMBER AT EACH AGE WHEN ADMITTED DURING THE YEAR.

AGE.	When Admitted.			When Attacked.		
	Males.	Females.	Total.	Males.	Females.	Total.
Under 15, -	--	--	--	1	2	3
15 to 20, -	2	2	4	4	5	9
20 to 25, -	7	6	13	9	11	20
25 to 30, -	9	13	22	9	12	21
30 to 35, -	11	9	20	7	10	17
35 to 40, -	7	15	22	7	12	19
40 to 45, -	11	8	19	9	6	15
45 to 50, -	6	5	11	6	2	8
50 to 60, -	7	4	11	5	1	6
60 to 70, -	4	5	9	4	2	6
70 to 80, -	3	2	5	2	1	3
80 and over, -	2	--	2	1	--	1
Unknown, -	1	2	3	6	7	13
Not insane, -	3	--	3	3	--	3
Total, -	73	71	144	73	71	144

TABLE IV.

NUMBER AT EACH AGE FROM THE BEGINNING OF THE HOSPITAL.

AGE.	When Admitted.			When Attacked.		
	Males.	Females.	Total.	Males.	Females.	Total.
Under 15, -	6	2	8	30	10	40
15 to 20, -	48	33	81	88	60	148
20 to 25, -	132	96	228	151	125	276
25 to 30, -	155	103	258	147	149	296
30 to 35, -	142	115	257	146	107	253
35 to 40, -	143	117	260	115	121	236
40 to 45, -	112	101	213	91	80	171
45 to 50, -	103	92	195	85	71	156
50 to 60, -	133	102	235	108	79	187
60 to 70, -	80	67	147	73	25	98
70 to 80, -	34	17	51	15	12	27
80 and over, -	7	11	18	4	6	10
Unknown, -	3	8	11	42	18	60
No insane, -	16	3	19	19	4	23
Total, -	1114	867	1981	1114	867	1981

TABLE V.
NATIVITY OF PATIENTS ADMITTED.

NATIVITY.	Within the Year.			From the Beginning.		
	Males.	Females.	Total.	Males.	Females.	Total.
Connecticut, - -	33	39	72	645	403	1048
New York, - - -	7	4	11	64	47	111
Massachusetts, -	3	1	4	28	14	42
Maine, - - - -	2	—	2	4	2	6
Rhode Island, -	—	—	—	15	10	25
Pennsylvania, -	—	—	—	5	—	5
Virginia, - - -	—	1	1	3	3	6
North Carolina, -	—	—	—	4	—	4
Vermont, - - -	—	—	—	4	3	7
New Jersey, - -	—	—	—	4	2	6
Florida, - - -	—	—	—	1	—	1
Louisiana, - - -	—	—	—	—	2	2
Maryland, - - -	—	—	—	2	1	3
Michigan, - - -	—	—	—	1	—	1
Ohio, - - - -	—	—	—	—	1	1
Georgia, - - -	—	—	—	—	1	1
South Carolina, -	—	—	—	1	—	1
New Hampshire, -	1	—	1	1	—	1
Canada, Dominion of	1	2	3	10	2	12
France, - - - -	—	1	1	3	1	4
Austria, - - -	—	—	—	—	1	1
Germany, - - -	4	1	5	46	40	86
England, - - -	4	1	5	37	24	61
Ireland, - - -	14	18	32	202	292	494
Scotland, - - -	1	—	1	8	8	16
Italy, - - - -	—	1	1	2	3	5
Cuba, - - - -	—	—	—	—	2	2
Switzerland, - -	1	—	1	4	—	4
Sweden, - - -	1	—	1	9	1	10
Bermuda, - - -	—	—	—	1	—	1
Norway, - - -	—	—	—	1	—	1
Unknown, - - -	1	2	3	9	4	13
Total, - - -	73	71	144	1114	867	1981

TABLE VI.
RESIDENCE OF PATIENTS ADMITTED.

RESIDENCE.	Within the Year.			From the Beginning.		
	Males.	Females.	Total.	Males.	Females.	Total.
State at Large, -	12	3	15	74	18	92
Hartford County, -	15	15	30	246	171	417
New Haven " -	15	21	36	258	256	514
New London, " -	7	6	13	117	106	223
Windham, " -	1	5	6	31	30	61
Litchfield, " -	3	4	7	55	70	125
Middlesex, " -	6	7	13	124	81	205
Tolland, " -	3	2	5	30	28	58
Fairfield, " -	11	8	19	169	105	274
Elsewhere, - -	—	—	—	10	2	12
Total, - - -	73	71	144	1114	867	1981

TABLE VII.

OCCUPATION OF THOSE ADMITTED.

OCCUPATION.	Within the Year.			From the Beginning.		
	Males.	Females.	Total.	Males.	Females.	Total.
Accountants, - - - -	1	—	1	12	—	12
Actresses, - - - -	—	1	1	—	1	1
Agents, - - - -	1	—	1	6	—	6
Artists, - - - -	—	—	—	1	1	2
Bakers, - - - -	1	—	1	1	—	1
Barbers, - - - -	1	—	1	4	—	4
Bar Tenders, - - - -	—	—	—	2	—	2
Blacksmiths, - - - -	—	—	—	12	—	12
Boiler Makers, - - - -	—	—	—	3	—	3
Book Binders, - - - -	—	—	—	1	1	2
Brewers, - - - -	—	—	—	1	—	1
Brick Layers, - - - -	—	—	—	5	—	5
Brokers, - - - -	—	—	—	1	—	1
Brush Makers, - - - -	—	—	—	2	—	2
Butchers, - - - -	—	—	—	4	—	4
Cabinet Makers, - - - -	—	—	—	8	—	8
Carmen, - - - -	—	—	—	2	—	2
Carpenters, - - - -	1	—	1	33	—	33
Carriage Makers, - - - -	—	—	—	6	—	6
Chemists, - - - -	—	—	—	1	—	1
Cigar Makers, - - - -	—	—	—	7	—	7
Clerks, - - - -	2	1	3	28	1	29
Clergymen, - - - -	—	—	—	1	—	1
Clock Makers, - - - -	—	—	—	1	—	1
Coachmen, - - - -	1	—	1	4	—	4
Commercial Travelers, - - - -	—	—	—	7	—	7
Conductors, - - - -	—	—	—	3	—	3
Coopers, - - - -	1	—	1	2	—	2
Curriers, - - - -	—	—	—	4	—	4
Cutlers, - - - -	1	—	1	2	—	2
Domestics, - - - -	—	10	10	—	182	182
Draw Bridge Tenders, - - - -	—	—	—	1	—	1
Druggists, - - - -	—	—	—	7	—	7
Dyers, - - - -	—	—	—	4	—	4
Electro Platers, - - - -	—	—	—	1	—	1
Engineers, - - - -	—	—	—	1	—	1
Factory Employes, - - - -	8	5	13	52	42	94
Farmers, - - - -	11	—	11	235	—	235
Fish Hook Makers, - - - -	—	—	—	2	—	2
Gardeners, - - - -	—	—	—	5	—	5
Glass Cutters, - - - -	—	—	—	1	—	1
Grocers, - - - -	—	—	—	7	—	7
Gunsmiths, - - - -	—	—	—	1	—	1
Harness Makers, - - - -	—	—	—	9	—	9
Hatters, - - - -	1	—	1	8	1	9
Hostlers, - - - -	—	—	—	9	—	9
Housekeepers, - - - -	—	—	—	—	56	56
Housewives, - - - -	—	28	28	—	337	337
Janitors, - - - -	1	—	1	1	—	1

TABLE VII.—Continued.

OCCUPATION OF THOSE ADMITTED.

OCCUPATION.	Within the Year.			From the Beginning.		
	Males.	Females.	Total.	Males.	Females.	Total.
Jewelers, - - - - -	—	—	—	2	—	2
Laborers, - - - - -	23	—	23	191	—	191
Landlords, - - - - -	—	—	—	1	—	1
Lawyers, - - - - -	—	—	—	2	—	2
Lumbermen, - - - - -	—	—	—	1	—	1
Machinists, - - - - -	1	—	1	42	—	42
Manufacturers, - - - - -	—	—	—	15	—	15
Mattress Makers, - - - - -	—	—	—	1	—	1
Mechanics, - - - - -	6	—	6	75	—	75
Merchants, - - - - -	—	—	—	34	—	34
Millers, - - - - -	—	—	—	2	—	2
Milliners, - - - - -	—	1	1	—	1	1
Moulders, - - - - -	—	—	—	6	—	6
News Boys, - - - - -	—	—	—	2	—	2
Night Watchmen, - - - - -	2	—	2	4	—	4
No employment, - - - - -	1	15	16	77	133	210
Painters, - - - - -	2	—	2	18	—	18
Paper Makers, - - - - -	—	—	—	2	—	2
Peddlers, - - - - -	—	—	—	5	1	6
Physicians, - - - - -	1	—	1	5	—	5
Pilots, - - - - -	—	—	—	3	—	3
Powder Makers, - - - - -	—	—	—	1	—	1
Printers, - - - - -	—	—	—	4	—	4
Pump Makers, - - - - -	—	—	—	1	—	1
Quarrymen, - - - - -	—	—	—	16	—	16
Rubber Workers, - - - - -	—	—	—	2	—	2
Sailors, - - - - -	1	—	1	16	—	16
Sail Makers, - - - - -	—	—	—	2	—	2
Saloon Keepers, - - - - -	2	—	2	4	—	4
Seamstresses, - - - - -	—	—	—	—	29	29
Soldiers, - - - - -	1	—	1	1	—	1
Shoe Makers, - - - - -	1	—	1	15	—	15
Stone Masons, - - - - -	—	—	—	7	—	7
Students, - - - - -	—	—	—	4	8	12
Speculators, - - - - -	—	—	—	1	—	1
Switch Tenders, - - - - -	—	—	—	1	—	1
Tailors, - - - - -	1	1	2	8	6	14
Teachers, - - - - -	—	6	6	7	34	41
Telegraph Operators, - - - - -	—	—	—	3	—	3
Tinsmiths, - - - - -	—	—	—	5	—	5
Truss Makers, - - - - -	—	—	—	1	—	1
Unknown, - - - - -	—	2	2	10	26	36
Upholsterers, - - - - -	—	—	—	1	—	1
Waiters, - - - - -	—	—	—	3	—	3
Weavers, - - - - -	—	1	1	2	6	8
Wire Weavers, - - - - -	—	—	—	1	—	1
Wood Carvers, - - - - -	—	—	—	2	1	3
Total, - - - - -	73	71	144	1114	867	1981

TABLE VIII.

CIVIL CONDITION OF THOSE ADMITTED.

	Within the Year.			From the Beginning..		
	Males.	Females	Total.	Males.	Females.	Total.
Single, - - - -	38	35	73	554	375	929
Married, - - - -	31	27	58	468	346	814
Widowed, - - - -	3	6	9	64	118	182
Unknown, - - - -	1	3	4	28	28	56
Total, - - - -	73	71	144	1114	867	1981

TABLE IX.

HOW COMMITTED.

	Within the year.			From the Beginning.		
	Males.	Females.	Total.	Males.	Females.	Total.
By Friends, - - -	—	1	1	111	62	173
Probate Judges, - - -	56	67	123	874	778	1652
Judges of the Superior Court,	7	1	8	59	7	66
Governor's Orders, - -	7	1	8	36	5	41
Justice or Police Court, -	3	1	4	33	15	48
Order of General Assembly,	—	—	—	1	—	1
Total, - - - -	73	71	144	1114	867	1981

TABLE X.

HOW SUPPORTED.

	Within the Year.			From the beginning.		
	Males.	Females.	Total.	Males.	Females.	Total.
By Self or Friends (paying),	—	1	1	113	60	173
By State and friends (indigent)	16	24	40	297	293	590
By State and Town (pauper),	45	43	88	518	495	1113
By State alone, - - -	12	3	15	86	19	105
Total, - - - -	73	71	144	1114	867	1981

TABLE XI.

FORM OF DISEASE IN THOSE ADMITTED.

FORM OF DISEASE.	Within the Year.			From the Beginning.		
	Males.	Females.	Total.	Males.	Females.	Total.
Mania Acute, - - -	25	14	39	325	230	555
Chronic, - - -	21	26	47	342	336	678
Epileptic, - - -	1	1	2	54	22	76
Hysterical, - - -	—	1	1	—	1	1
Puerperal, - - -	—	2	2	—	22	22
Suicidal, - - -	—	—	—	4	5	9
Homicidal, - - -	—	—	—	4	3	7
Recurrent, - - -	1	1	2	14	19	33
Delirium Simple, - - -	—	—	—	10	—	10
Monomania, - - -	—	—	—	15	4	19
Melancholia, Acute, - - -	5	9	14	85	83	168
Chronic, - - -	3	4	7	39	59	98
Attonita, - - -	—	—	—	4	2	6
General Paresis, - - -	3	—	3	27	1	28
Methomania, - - -	1	—	1	57	3	60
Dementia Acute, - - -	—	1	1	12	7	19
Chronic, - - -	3	7	10	43	38	81
Senile, - - -	4	3	7	24	20	44
Imbecility, - - -	2	2	4	34	8	42
Neurasthenia, - - -	1	—	1	2	—	2
Not Insane, - - -	3	—	3	19	4	23
Total, - - -	73	71	144	1114	867	1981

TABLE XII.

COMPLICATIONS (OF NERVOUS SYSTEM) IN THOSE ADMITTED.

COMPLICATIONS.	Within the Year.			From the Beginning.		
	Males.	Females.	Total.	Males.	Females.	Total.
Aphasia, - - -	—	—	—	5	—	5
Apoplexy, - - -	1	—	1	5	—	5
Chorea, - - -	—	—	—	3	3	6
Epilepsy, - - -	1	1	2	53	23	76
Hemiplegia, - - -	—	3	3	4	4	8
Hysteria, - - -	—	1	1	—	1	1
Hereditary Tendency, - - -	19	18	37	253	198	451
Paraplegia, - - -	—	—	—	2	2	4
Paralysis Agitans, - - -	1	—	1	1	1	2
Pseudo Hypertrophic Paralysis	—	—	—	—	1	1
Prog. Muscular Atrophy, - - -	—	—	—	1	1	2
Spinal Paralysis, - - -	—	—	—	1	—	1
Without Complications, - - -	51	48	99	786	633	1419
Total, - - -	73	71	144	1114	867	1981

TABLE XIII.

NUMBER OF ATTACKS IN THOSE ADMITTED.

	Within the Year.			From the Beginning.		
	Males.	Females.	Total.	Males.	Females.	Total.
First, - - - - -	53	59	112	764	616	1380
Second, - - - - -	2	4	6	130	110	240
Third, - - - - -	2	1	3	36	42	78
Fourth, - - - - -	1	1	2	18	13	31
Fifth, - - - - -	—	2	2	5	10	15
Sixth, - - - - -	—	—	—	3	4	7
Seventh, - - - - -	—	1	1	3	4	7
Eighth, - - - - -	—	—	—	—	3	3
Several, - - - - -	—	1	1	38	17	55
Unknown, - - - - -	12	2	14	98	44	142
Not insane, - - - - -	3	—	3	19	4	23
Total, - - - - -	73	71	144	1114	867	1981

TABLE XIV.

DURATION OF INSANITY BEFORE ENTRANCE OF THOSE
ADMITTED.

	Within the Year.			From the Beginning.		
	Males.	Females.	Total.	Males.	Females.	Total.
Less than 1 month, - - -	5	4	9	155	98	253
1 to 3 months, - - -	7	5	12	170	93	263
3 to 6 " - - -	9	8	17	105	71	176
6 to 9 " - - -	6	4	10	58	64	122
9 to 12 " - - -	3	1	4	56	37	93
12 to 18 " - - -	4	4	8	57	64	121
18 to 24 " - - -	3	6	9	49	41	90
2 to 3 years, - - -	7	2	9	97	77	174
3 to 5 " - - -	7	7	14	87	87	174
5 to 10 " - - -	5	13	18	84	87	171
10 to 15 " - - -	4	2	6	41	34	75
15 to 20 " - - -	1	3	4	19	27	46
20 to 25 " - - -	1	3	4	15	12	28
25 to 30 " - - -	1	—	1	13	4	17
30 and over, - - -	—	2	2	7	17	24
Unknown, - - -	7	7	14	81	49	130
Not insane, - - -	3	—	3	19	4	23
Total, - - - - -	73	71	144	1114	867	1981

TABLE XV.

RECOVERED OF THOSE ATTACKED AT THE SEVERAL AGES FROM
THE BEGINNING.

AGE.	Number Recovered.			Per Cent Recovered of Those Attacked from the Beginning.		
	Males.	Females.	Total.	Males.	Females.	Total.
Under 15, -	-	-	-	-	-	-
15 to 20, -	15	16	31	17.04	26.66	20.94
20 to 25, -	42	31	73	27.15	24.80	26.48
25 to 30, -	33	27	60	22.45	18.12	23.64
30 to 35, -	32	23	55	21.91	21.46	21.73
35 to 40, -	38	20	58	31.29	16.52	24.11
40 to 45, -	24	14	38	26.37	17.50	22.22
45 to 50, -	21	11	32	25.87	15.49	20.51
50 to 60, -	22	15	37	20.37	18.98	19.73
60 to 70, -	15	3	18	20.54	12.00	18.36
70 to 80, -	2	-	2	13.33	-	7.40
Over 80, -	1	-	1	25.00	-	10.00
Total, -	245	160	405			

TABLE XVI.

RECOVERED AFTER VARIOUS DURATIONS OF DISEASE BEFORE
TREATMENT FROM THE BEGINNING.

DURATION.	Number Recovered.			Per Cent Recovered.		
	Males.	Females.	Total.	Males.	Females.	Total.
Under 1 month,	93	50	143	60.00	51.02	56.52
1 to 3 months,	72	39	111	42.35	41.93	42.20
3 to 6 " "	27	23	50	25.71	31.26	28.40
6 to 9 " "	13	12	25	22.41	18.75	20.49
9 to 12 " "	11	7	18	19.61	18.91	19.35
1 to 2 years,	14	14	28	13.20	13.33	13.27
2 to 3 " "	7	4	11	7.21	5.19	6.20
3 to 5 " "	6	6	12	6.89	6.89	6.89
5 to 10 " "	2	4	6	2.38	4.59	3.50
Over 10 " "	-	1	1	-	1.05	0.53
Total, -	245	160	405			

TABLE XVII.

DURATION OF TREATMENT OF THOSE RECOVERED FROM THE
BEGINNING..

DURATION.	Number Recovered.		
	Males.	Females.	Total.
Under 1 month, - - - -	44	13	57
1 to 2 months, - - - -	44	14	58
2 to 3 " - - - -	40	36	76
3 to 6 " - - - -	49	46	95
6 to 9 " - - - -	26	14	40
9 to 12 " - - - -	18	6	24
12 to 18 " - - - -	12	13	25
18 to 24 " - - - -	1	7	8
2 to 3 years, - - - -	4	3	7
3 to 5 " - - - -	6	6	12
Over 5 " - - - -	1	2	3
Total, - - - -	245	160	405
Average duration of all, - -	5.10 months.	8.33 months.	6.89 months.

TABLE XVIII.

WHOLE DURATION OF DISEASE OF THOSE RECOVERED FROM
THE BEGINNING.

DURATION.	Number Recovered.		
	Males.	Females.	Total.
Under 1 month, - - - -	32	10	42
1 to 2 months, - - - -	47	16	63
2 to 3 " - - - -	19	10	29
3 to 6 " - - - -	45	32	77
6 to 9 " - - - -	24	29	53
9 to 12 " - - - -	24	11	35
12 to 18 " - - - -	17	13	30
18 to 24 " - - - -	9	9	18
2 to 3 years, - - - -	10	12	22
3 to 5 " - - - -	12	9	21
Over 5 " - - - -	6	9	15
Total, - - - -	245	160	405
Average duration of all, - -	9.69 months.	14.04 mos.	11.59 mos.

TABLE XIX.

FORM OF DISEASE OF THOSE RECOVERED FROM THE BEGINNING.

DISEASE.	Number Recovered.			Per Cent Recovered of each Form Admitted.		
	Males.	Females.	Total.	Males.	Females.	Total.
Mania—Acute, - - -	148	85	233	45.50	36.95	41.98
Chronic, - - -	14	26	40	4.09	7.64	5.89
Epileptic, - - -	3	1	4	5.55	4.53	5.26
Puerperal, - - -	—	13	13	—	54.54	54.54
Recurrent, - - -	5	6	11	35.71	31.57	33.33
Suicidal, - - -	—	2	2	—	40.00	22.22
Delirium Simple, - - -	10	—	10	100.	—	100.00
Dementia Acute, - - -	2	2	4	16.66	28.56	21.05
Monomania, - - -	4	1	5	26.66	25.00	26.31
Methomania, (Inebriates), -	30	3	33	52.63	100.00	55.00
Melancholia—Acute, -	25	19	44	29.41	22.89	26.19
Chronic, - - -	3	2	5	7.69	3.38	5.10
Neurasthenia, - - -	1	—	1	50.00	—	50.00
Total, - - - -	245	160	405			

TABLE XX.

CAUSE (EXCITING) OF DISEASE OF THOSE RECOVERED FROM THE BEGINNING.

CAUSE.	Number Recovered.			Per Cent Recovered of each Class Admitted.		
	Males.	Females.	Total.	Males.	Females.	Total.
Anxiety of mind, business and otherwise, - - -	18	12	30	25.00	36.36	28.57
Connected with the affections, -	12	10	22	28.12	20.00	26.82
Connected with the fluctuations of fortune, - -	8	1	9	50.00	20.00	42.85
Connected with religion, -	13	9	22	44.83	36.00	40.74
Epilepsy, - - -	3	1	4	5.77	4.54	5.40
Excessive Venery, - - -	4	—	4	33.33	—	33.33
Ill Health, - - -	28	42	70	24.13	21.64	22.57
Intemperance, - - -	75	9	84	46.23	42.85	45.90
Masturbation, - - -	10	—	10	12.53	—	11.48
Nervous Shock, - - -	1	2	3	16.66	33.33	25.00
Over Study, - - -	1	2	3	16.66	22.22	20.00
Puerperal, Pregnancy, &c., -	—	16	16	—	43.24	43.24
Scarlet Fever, - - -	—	1	1	—	100.00	100.00
Tobacco, - - -	3	—	3	42.85	—	42.85
Confinement, - - -	2	—	2	40.00	—	40.00
Over Work, - - -	1	4	5	4.34	19.04	11.33
Unknown, - - -	66	51	117	15.56	13.50	14.46
Total, - - - -	245	160	405			

TABLE XXI.

AGES AT DEATH.

AGE.	Within the Year.			From the Beginning.		
	Males.	Females.	Total.	Males.	Females.	Total.
Under 15, - - -	—	—	—	—	—	—
15 to 20, - - -	—	1	1	2	3	5
20 to 25, - - -	—	—	—	8	7	15
25 to 30, - - -	1	3	4	13	12	25
30 to 35, - - -	—	2	2	10	3	13
35 to 40, - - -	1	1	2	25	15	40
40 to 45, - - -	2	1	3	22	10	32
45 to 50, - - -	4	—	4	29	12	41
50 to 60, - - -	3	1	4	38	20	58
60 to 70, - - -	3	2	5	38	20	58
70 to 80, - - -	2	2	4	18	13	31
80 to 90, - - -	—	1	1	5	6	11
Over 90, - - -	—	—	—	1	2	3
Total, - - -	16	14	30	209	123	332

TABLE XXII.
DEATHS AND THE CAUSES.

CAUSE.	Within the Year.			From the Beginning.		
	Males.	Females.	Total.	Males.	Females.	Total.
Atheroma Arterianum, - -	—	—	—	1	—	1
Aneurism of Internal Carotid.	—	1	1	—	1	1
Atrophy of Brain, - -	—	—	—	—	1	1
Apoplexy, - - - -	1	2	3	17	4	21
Bright's Disease, - - -	2	—	2	8	2	10
Cancer of Breast, - - -	—	—	—	—	2	2
Cancer of Stomach, - - -	—	—	—	1	—	1
Cancer of Uterus, - - -	—	—	—	—	1	1
Cancer, Medullary, - - -	—	—	—	—	1	1
Carbuncle, - - - -	—	—	—	1	—	1
Cardiac Hypertrophy, - -	—	—	—	1	—	1
Cardiac Paralysis, - - -	—	—	—	—	1	1
Cardiac Thrombosis, - - -	1	—	1	1	1	2
Cerebral Softening, - - -	1	—	1	1	—	1
Cirrhosis of Liver, - - -	—	—	—	1	2	3
Congestion of Lungs, - -	—	—	—	1	1	2
Diarrhœa, - - - -	—	—	—	3	3	6
Drowning, Accidental, - -	—	—	—	1	—	1
Dysentery, - - - -	—	—	—	2	3	5
Epilepsy, - - - -	—	2	2	7	7	14
Erysipelas, - - - -	1	—	1	7	1	8
Fracture of Larynx, - - -	—	—	—	1	—	1
Gangrene of Lungs, - - -	—	—	—	2	1	3
General Paresis, - - - -	1	—	1	22	1	23
Inanition, - - - -	—	—	—	5	5	10
Injuries from Fall, - - -	—	—	—	2	—	2
Leucocythæmia, - - - -	—	—	—	—	1	1
Mania, Acute, Exh'n. from, -	2	—	2	21	10	31
Mania, Chronic, " " - -	—	4	4	16	12	28
Melancholia, " " - - -	1	1	2	3	3	6
Meningitis, - - - -	—	1	1	—	2	2
Nephritis, Acute Desq'tive, -	—	—	—	—	1	1
Ossification of Cor. Arteries,	—	—	—	1	—	1
Osteoarthritis Chronica, - -	—	—	—	1	—	1
Phthisis Pulmonalis, - - -	2	1	3	24	17	41
Pleurisy, - - - -	—	—	—	4	1	5
Pneumonia, - - - -	1	—	1	12	4	16
Peritonitis, Chronic, - - -	—	—	—	—	1	1
Pyæmia, - - - -	—	—	—	1	—	1
Senility, - - - -	1	2	3	17	16	33
Septicæmia, - - - -	—	—	—	1	—	1
Shock from Injuries, - - -	—	—	—	—	1	1
Strangulation by Food, - - -	—	—	—	3	—	3
Strangulation by Suicide, - -	1	—	1	5	5	10
Syphilis, - - - -	1	—	1	2	—	2
Tuberculosis, - - - -	—	—	—	1	3	4
Tetanus, - - - -	—	—	—	1	—	1
Typhomania, - - - -	—	—	—	—	2	2
Undetermined, - - - -	—	—	—	6	4	10
Ulceration of Gall Bladder, -	—	—	—	1	—	1
Uterine Hemorrhage, - - -	—	—	—	—	1	1
Violence, - - - -	—	—	—	2	1	3
Valvular Disease of Heart, -	—	—	—	2	—	2
Total, - - - -	16	14	30	209	123	332

TABLE XXIII.

RATIO OF DEATHS FROM THE BEGINNING.

PER CENT.	Males.	Females.	Total.
Of all admitted, - - - -	18.76	14.14	16.75
Of average number in Hospital, -	8.99	5.22	7.09

TABLE XXIV.

DURATION OF DISEASE OF THOSE WHO DIED FROM THE BEGINNING.

DURATION.	From Admission into the Hospital.			From the Attack.		
	Males.	Females.	Total.	Males.	Females.	Total.
Under 1 month, -	32	19	51	6	8	14
1 to 2 months, -	12	10	22	9	4	13
2 to 3 " -	26	3	29	9	3	12
3 to 6 " -	24	13	37	11	4	15
6 to 9 " -	19	5	24	14	5	19
9 to 12 " -	14	5	19	8	6	14
12 to 18 " -	24	16	40	21	6	27
18 to 24 " -	5	4	9	19	7	26
2 to 3 years, -	18	15	33	20	10	30
3 to 5 " -	15	19	34	29	20	49
5 to 10 " -	18	13	31	24	25	49
10 to 15 " -	2	1	3	14	8	22
15 to 20 " -	—	—	—	10	6	16
20 to 25 " -	—	—	—	5	1	6
25 to 30 " -	—	—	—	3	1	4
30 to 40 " -	—	—	—	3	4	7
40 to 50 " -	—	—	—	1	2	3
Unknown, -	—	—	—	3	3	6
Average of all, -	Months. 19.78	Months. 25.88	Months. 22.04	Years. 5.37	Years. 6.73	Years. 5.92

TABLE XXV.

REMAINING IN THE HOSPITAL AT THE END OF THE YEAR.

AGE.					Males.	Females.	Total.
Under 15,	-	-	-	-	1	—	1
15 to 20,	-	-	-	-	2	1	3
20 to 25,	-	-	-	-	17	9	26
25 to 30,	-	-	-	-	29	29	58
30 to 35,	-	-	-	-	41	30	71
35 to 40,	-	-	-	-	36	51	87
40 to 45,	-	-	-	-	32	46	78
45 to 50,	-	-	-	-	23	29	52
50 to 60,	-	-	-	-	36	49	85
60 to 70,	-	-	-	-	23	22	45
70 to 80,	-	-	-	-	8	9	17
80 to 90,	-	-	-	-	3	2	5
Over 90,	-	-	-	-	—	—	—
Total,	-	-	-	-	251	277	528

TABLE XXVI.

REMAINING AT THE END OF THE YEAR—DURATION OF THE DISEASE.

				Since Admission.			Since the Attack.		
				Males.	Females.	Total.	Males.	Females.	Total.
Under 1 month,	-	-	-	6	9	15	1	1	2
1 to 2 months,	-	-	-	3	12	15	—	2	2
2 to 3 "	-	-	-	4	8	12	1	11	12
3 to 6 "	-	-	-	10	33	43	3	6	9
6 to 9 "	-	-	-	16	31	47	4	7	11
9 to 12 "	-	-	-	10	7	17	5	14	19
12 to 18 "	-	-	-	14	13	27	6	10	16
18 to 24 "	-	-	-	17	9	26	8	10	18
2 to 3 years,	-	-	-	30	16	46	21	38	59
3 to 5 "	-	-	-	28	22	50	33	77	110
5 to 10 "	-	-	-	74	72	146	60	30	90
10 to 15 "	-	-	-	39	45	84	39	31	70
15 to 20 "	-	-	-	—	—	—	22	16	38
20 to 25 "	-	-	-	—	—	—	12	6	18
25 to 30 "	-	-	-	—	—	—	5	5	10
30 to 40 "	-	-	-	—	—	—	9	3	12
Over 40 "	-	-	-	—	—	—	—	4	4
Unknown,	-	-	-	—	—	—	22	6	28
Total,	-	-	-	251	277	528	251	277	528

TABLE XXVII.
REMAINING AT THE END OF THE YEAR—PROSPECT.

PROSPECT.	Males.	Females.	Total.
Curable, - - - - -	15	23	38
Incurable, - - - - -	236	254	490
Total, - - - - -	251	277	528

TABLE XXVIII.
ADMISSIONS FROM CAUSES.

CAUSES.	Within the Year.			From the Beginning.		
	Males.	Females.	Total.	Males.	Females.	Total.
Anx'ty of mind, bus. and otherwise,	2	6	8	72	33	105
Apoplexy, - - - - -	1	—	1	10	1	11
Confinement, - - - - -	1	—	1	5	—	5
Congenital, - - - - -	—	2	2	1	2	3
Connected with the affections, -	2	4	6	32	50	82
Domestic difficulties, - - - - -	—	—	—	5	7	12
Dissipation, - - - - -	—	1	1	—	1	1
Epilepsy, - - - - -	1	1	2	52	22	74
Excessive Venery, - - - - -	1	—	1	12	—	12
Fluctuations of fortune, - - - - -	—	—	—	16	5	21
Hysteria, - - - - -	—	1	1	—	1	1
Ill Health, - - - - -	1	1	2	116	194	310
Injury to Head, - - - - -	1	1	2	11	1	12
Intemperance, - - - - -	14	5	19	162	21	182
Masturbation, - - - - -	4	1	5	79	8	87
Menopausis, - - - - -	—	—	—	—	5	5
Meningitis Acute, - - - - -	—	—	—	—	2	2
Nervous Shock, - - - - -	—	1	1	6	6	12
Nostalgia, - - - - -	—	2	2	—	3	3
Not Insane, - - - - -	3	—	3	19	4	23
Old Age, - - - - -	4	2	6	10	14	24
Over Study, - - - - -	—	—	—	6	9	15
Scarlatina, - - - - -	1	—	1	1	1	2
Typhoid Fever, - - - - -	—	1	1	4	2	6
Over Work, - - - - -	1	5	6	23	21	44
Partial Insolation, - - - - -	1	—	1	5	—	5
Puerperal, State and Pregnancy,	—	3	3	—	37	37
Religion, - - - - -	—	—	—	29	25	54
Syphilis, - - - - -	2	—	2	6	—	6
Tobacco, - - - - -	—	—	—	7	—	7
Tuberculosis, - - - - -	—	—	—	1	—	1
Uterine Disease, - - - - -	—	5	5	—	7	7
Unknown, - - - - -	33	29	62	424	385	809
Total, - - - - -	73	71	144	1114	867	1981

TABLE XXIX.—Operations of the Hospital from the Beginning, in each Year.

PATIENTS.		Year ending March 31, 1869.	Year ending March 31, 1870.	Year ending March 31, 1871.	Year ending March 31, 1872.	Year ending March 31, 1873.	Year ending March 31, 1874.	Year ending March 31, 1875.	Year ending March 31, 1876.	Period ending Nov. 30, 1876.	Year ending Nov. 30, 1877.	Year ending Nov. 30, 1878.	Year ending Nov. 30, 1879.	Year ending Nov. 30, 1880.	Total.
Admitted—	Males,	165	78	49	56	43	93	122	108	59	92	101	75	73	1114
	Females,	103	56	26	36	31	160	88	58	29	61	60	88	71	867
Total,		268	134	75	92	74	253	210	166	88	153	161	163	144	1981
Discharged, Recovered—	Males,	25	27	14	11	8	16	24	33	12	26	20	18	11	245
	Females,	—	16	6	9	3	21	17	12	9	15	12	27	19	160
Total,		25	43	20	17	11	37	41	45	18	41	32	45	30	405
Improved—	Males,	11	8	14	7	8	9	19	23	21	24	26	20	15	205
	Females,	—	10	5	4	5	20	25	23	11	20	14	13	14	164
Total,		11	18	19	11	13	29	44	46	32	44	40	33	29	369
Stationary—	Males,	6	17	8	14	11	13	14	18	12	20	21	23	26	203
	Females,	—	10	6	10	9	15	20	14	5	14	15	14	11	143
Total,		6	27	14	24	20	28	34	32	17	34	36	37	37	346
Died—	Males,	14	18	11	9	12	18	21	26	9	19	27	9	16	209
	Females,	1	3	10	6	9	17	15	7	6	12	13	10	14	123
Total,		15	21	21	15	21	35	36	33	15	31	40	19	30	332
Whole No. in the year,		268	343	307	329	336	524	605	616	548	619	629	644	654	
No. at the end of the year,		209	232	237	262	271	395	430	460	465	468	481	510	528	

TABLE XXX.

ADMISSIONS AND DISCHARGES—RATIO PER CENT.

	Within the Year.	From the Beginning.
<i>Admissions from Causes :</i>		
Anxiety of Mind and Over-study, - - -	5.55	5.30
Apoplexy, - - - - -	.69	.55
Connected with the Affections, - - -	4.16	4.13
Connected with fluctuations of Fortune, - -	—	1.05
Connected with Religion, - - - - -	—	2.72
Epilepsy, - - - - -	1.38	3.73
Ill Health, - - - - -	1.38	15.64
Intemperance, - - - - -	13.19	9.23
Masturbation, - - - - -	3.47	4.39
Old Age, - - - - -	4.16	1.22
Puerperal, - - - - -	2.77	1.86
Unknown, - - - - -	43.05	40.85
<i>Recovered of all Cases Admitted :</i>		
Under one Year, - - - - -	26.92	32.96
One Year and Over, - - - - -	17.39	9.86
Deaths of all under care, - - - - -	4.58	16.75
Deaths of average number in Hospital, - -	5.83	7.09

Treasurer's Report.

The following statement of the fiscal concerns of "The Connecticut Hospital for the Insane," for the term commencing December 1st, 1879, and ending November 30th, 1880, is respectfully submitted to the Board of Trustees :

RECEIPTS.

Balance in hands of the Treasurer, Dec. 1st, 1879, -	\$223 22
Revenue account from the Hospital, - - -	114,438 94
	<hr/>
	\$114,662 16

PAYMENTS.

Amount of Superintendent's orders, - - - -	\$114,349 52
Balance in hands of Treasurer Nov. 30, 1880, - -	312 64
	<hr/>
	\$114,662 16

All of which is respectfully submitted.

M. B. COPELAND,

Treasurer.

MIDDLETOWN, CONN., Dec 1st, 1880. .

We hereby certify that we have examined the vouchers and accounts of the Hospital, of which the above is an abstract, and find them correct.

H. SIDNEY HAYDEN,	}	<i>Finance Committee.</i>
HENRY WOODWARD,		
J. W. ALSOP, M. D.		

Superintendent's Financial Report.

DEBTOR.

Dec. 1, 1879.	To cash on hand, - -	\$28 99
" " "	To balance with Treasurer,	223 22
Nov. 30, 1880.	To revenue for year,	114,438 94
		<hr/> \$114,691 15

CREDIT.

Dec., 1879.	By Vouchers, - - -	\$11,712 52
Jan., 1880.	" " - - -	5,467 25
Feb., "	" " - - -	10,609 49
March, "	" " - - -	8,391 56
April, "	" " - - -	8,186 30
May, "	" " - - -	9,520 54
June, "	" " - - -	10,426 64
July, "	" " - - -	8,493 06
August, "	" " - - -	13,330 96
Sept., "	" " - - -	8,235 00
Oct., "	" " - - -	10,528 95
Nov., "	" " - - -	9,253 48
		<hr/> \$114,155 75
Nov. 30, 1880.	By Cash on hand, - - -	222 76
" " "	By balance with Treasurer, - -	312 64
		<hr/> \$114,691 15

We hereby certify that we have examined vouchers and accounts of the Connecticut Hospital for Insane, for the year ending Nov. 30, 1880, and find the same to be correct. Also, that there remained in the hands of the Superintendent of said Institution, the sum of \$222.76 in cash, and in the hands of the Treasurer the sum of \$312.64 in cash, making a total of \$535.40 cash on hand at the above date.

GREENE KENDRICK, } *Auditors of Institutions*
J. C. HAMMOND, JR., } *Receiving State Aid, &c.*

Abstract of Vouchers for the Year Ending November 30th, 1880.

MONTH.	Salaries of Officers and Pay	Furniture and Fixtures.	Fuel and Lights.	Dry Goods and Clothing.	Stationery and Postage.	Provision.	Fish.	Flour.	Meat.	Groceries.
Dec., 1879,	\$2,344.91	\$221.15	\$2,967.61	\$459.26	\$117.71	\$772.63	\$291.97	\$206.29	\$272.14	\$1,066.20
Jan., 1880,	-	189.26	41.57	534.26	52.00	7.04	—	652.50	—	323.07
Feb., "	-	627.47	4.00	739.02	70.63	1,323.94	172.80	376.25	1,414.10	1,367.55
March, "	-	147.55	997.97	292.29	304.12	768.95	874.43	331.03	684.88	472.97
April, "	-	217.81	—	490.25	32.58	818.86	291.32	172.00	1,354.21	799.38
May, "	-	2,348.27	344.14	483.73	121.85	668.63	280.66	662.78	1,244.01	889.44
June, "	-	158.59	2,693.08	333.26	88.02	816.84	225.18	405.75	207.10	1,088.50
July, "	-	2,298.57	1,959.88	352.53	67.82	281.57	265.47	—	1,199.85	273.56
August, "	-	2,388.32	2,210.65	549.69	24.38	1,181.61	186.48	700.75	299.63	1,757.88
Sept., "	-	2,314.31	571.76	433.86	147.28	1,016.67	120.18	344.65	330.20	996.69
Oct., "	-	2,402.92	1,903.50	477.55	51.72	1,108.18	164.77	368.75	1,012.00	909.22
Nov., "	-	2,330.52	1,272.82	483.66	24.50	1,511.60	121.71	380.00	23.24	259.92
Total,	-	28,449.75	14,966.98	5,629.36	1,102.61	10,276.52	2,994.97	4,600.75	8,041.36	10,204.38

Abstract of Vouchers for the Year.—Continued.

MONTH.	Farm and Garden.	Construction.	Freight.	Medical Stores.	Burial.	Refunded.	Repairing.	Insurance.	Miscellaneous.	Total.
Dec., 1879,	\$262.30	\$1,308.95	\$48.31	\$235.97	\$15.25	\$52.67	\$944.29	\$28.00	\$96.91	\$11,712.52
Jan., 1880,	188.35	—	69.42	35.00	17.75	—	496.27	105.00	364.95	5,467.25
Feb., "	351.19	71.48	56.24	124.04	15.25	—	1,338.92	166.00	72.27	10,609.49
March, "	388.72	—	26.48	87.80	—	6.90	586.24	—	76.24	8,391.56
April, "	501.88	6.22	66.38	114.98	—	—	893.53	—	142.61	8,186.30
May, "	1,015.54	3.51	36.06	48.55	—	20.10	895.28	—	299.40	9,520.54
June, "	860.95	20.40	29.13	207.79	15.64	55.70	797.28	—	129.85	10,426.64
July, "	241.97	371.69	37.30	32.25	45.30	13.14	602.36	—	80.68	8,493.06
August, "	420.65	2,495.53	21.07	283.04	32.00	4.28	409.75	37.50	302.53	13,330.96
Sept., "	268.22	296.41	33.43	71.13	—	—	870.25	25.00	84.99	8,235.00
Oct., "	229.97	215.77	26.19	46.96	15.25	—	1,067.23	10.58	301.59	10,528.95
Nov., "	1,368.50	—	34.70	165.51	8.15	8.47	689.94	—	79.57	9,253.48
Total,	6,098.24	4,789.96	484.71	1,453.02	164.59	161.26	9,591.34	372.08	2,031.59	\$114,155.75

Appendix.

ADMISSION OF PATIENTS.

1. Whenever a patient is sent to the Hospital by the order of the Probate Court, the order or warrant, or a copy thereof, by which the person is sent, shall be lodged with the Superintendent.

2. Each patient, before admission, shall be made perfectly clean, and be free from vermin, or any contagious or infectious disease.

3. Each male patient shall be provided with at least two shirts, one woolen coat, one woolen vest, one pair woolen pantaloons, two pair new socks, one pair new shoes or boots, and one comfortable outside garment.

Each female patient shall, in addition to a quantity of under-clothing, shoes and stockings corresponding to that required for the male patient, have one flannel petticoat, two good dresses, one cloak or other good outside garment. Extra and better apparel is very desirable for Chapel worship and out-of-door's exercise and riding.

4. In all cases the patient's best clothing should be sent ; it will be carefully preserved, and only used when deemed necessary for the purpose above mentioned. Jewelry, and all superfluous articles of dress, knives, etc., should be left at home, as they are liable to be lost, and for them the officers of the Hospital are not responsible.

5. A written history of the case should be sent with the patient, and, if possible, some one acquainted with the individual should accompany him to the Hospital, from whom minute, but often essential, particulars may be learned.

6. The price of board, including washing, mending and attendance, for all who are supported at the public charge, is four dollars per week.

7. Pauper patients, or those supported partly by the towns in which they reside, and partly by the State, are admitted agreeably to Section 1, Chap. 103, Public Acts, 1878.

8. Indigent persons, or those possessing little property, and partly supported by friends and partly by the State, are admitted under Section 1, Chap. 103, Public Acts, 1878.

9. Private patients, or those supported by themselves or their friends, are admitted to the Hospital under Section 2, Chap. 103, Public Acts, 1878.

10. Visitors are admitted to the institution between the hours of ten A. M. and twelve, M., and between two and four P. M. on Mondays, Wednesdays and Fridays only, but no visitors shall be admitted to the Wards occupied by patients without express permission from the Superintendent, and especial care is to be taken that no amount of visiting is permitted that might prove injurious to the patients.

CHAPTER CIII.

An Act concerning Connecticut Hospital for the Insane.

Be it enacted by the Senate and House of Representatives in General Assembly convened :

SEC. 1. When any pauper in any town may be insane, a selectman of such town shall apply to the judge of probate of the district wherein said pauper resides, for his admission to said hospital ; and said judge shall appoint a respectable physician, who shall fully investigate the facts of the case, and report to said judge, and if such physician shall be satisfied that said pauper is insane, the judge shall order such selectmen forthwith to take such insane pauper to the hospital, where he shall be kept and supported so long as may be requisite, and two dollars and fifty cents of the expense of his support shall be paid by the town legally chargeable with his support, and the balance by the State ; and when an indigent person, not a pauper, is insane, application may be made in his behalf to the judge of probate for the district where he resides, who shall appoint a respectable physician and a Selectman of the town where said indigent person resides, who shall fully investigate the facts and report to said judge, who, if satisfied that such person is indigent and insane, shall order him to be taken, by the person making the application, to the hospital, *where he shall be kept and supported as long as may be requisite ; and half of the expenses of his support shall be paid by the State, and half by the person making the application :* and when a judge shall issue an order for the admission of any pauper or indigent person to the hospital, he shall record it, and immediately transmit a duplicate to the governor.

SEC. 2. The trustees may authorize the superintendent to admit patients into the hospital, under special agreements, when there are vacancies.

SEC. 3. The price for keeping any pauper or indigent person shall be fixed by the trustees, and shall not exceed the sum of four dollars per week, and shall be payable quarterly.

SEC. 4. There shall be taxed monthly, by the comptroller, one dollar and fifty cents for each week's board at said hospital, and two dollars for each week's board at any other hospital or asylum for the insane, of all insane paupers belonging to towns in this State, committed in pursuance of the first section of this act, and two dollars for each week's board at said hospital and one-half of the expense of each week's board at any other hospital or asylum for the insane of all insane indigent persons committed in pursuance of said first section of this act ; and the superintendent of each of said institutions shall make the bill therefor, and present it to the governor, upon whose approval it shall be paid from the State treasury.

SEC. 6. This act shall take effect from its passage.

Approved March 29, 1878.

REPORT

OF

Committee on Additional Buildings

FOR THE

ACCOMMODATION OF THE INSANE

AT

MIDDLETOWN.

Printed by Order of the General Assembly.

HARTFORD, CONN.:

PRESS OF THE CASE, LOCKWOOD & BRAINARD CO.

1881.

State of Connecticut.

REPORT.

To the Honorable General Assembly of the State of Connecticut :

Under a resolution of the General Assembly, January session, 1880, entitled, "Concerning an addition to the Insane Asylum at Middletown," the undersigned were appointed by His Excellency Gov. Andrews as a committee to carry out the provisions of said resolution. And it is made a part of their duty to report to the General Assembly now in session.

In pursuance of the duty assigned, the committee entered at once upon their work, holding their first meeting in Hartford, April 13, 1880. Their first business was to make themselves acquainted with the plans and estimates which had been adopted by the legislature.

These plans and estimates had been submitted to the legislature in 1879 by a commission which had given the subject much time and careful consideration. To gain a fuller knowledge of said plans and estimates, it became necessary to confer with G. W. Russell, M. D., the chairman of said commission, and with Geo. Keller, Esq., employed by the commission as architect. Both of these gentlemen courteously responded to an invitation to meet the committee and to explain the general plan and the details, so far as they had been worked out. The committee found that it would be for the interest of the State to retain the services of Mr. Keller as their architect, and they ratified the conditional arrangement which the commission had made with him.

Mr. Keller was at once to make the drawings and specifications, to furnish the working plans as needed, and to have general superintendence of the construction of the building.

The committee made a contract with C. B. Richards, Esq., mechanical engineer, to furnish suitable plans and specifications for the boilers and the steam-heating apparatus.

The drawings and specifications of the architect and engineer were prepared with all possible care and dispatch. The many details of a work of this magnitude required frequent meetings of the committee, not only for consultation with the architect and engineer, but with practical builders, who were asked to look over the specifications. Some valuable suggestions were received from them. The committee were also greatly assisted by the judicious advice of Dr. Russell, who was frequently present at their deliberations. Likewise by Dr. Shew, who has heartily coöperated by his counsels and efforts to give the work its highest success.

To both of these gentlemen the committee are under great obligations.

The committee met, at an early date, the trustees of the asylum. The matter of the bakery, laundry, and apartments for insane convicts came up for consideration. It was desirable to have only one bakery and one laundry for the whole institution. The present ones were insufficient. It had been suggested in the report to the legislature, in 1879, that the present laundry was to be enlarged by the addition of the bakery, and a new bakery was to be erected at a cost of thirty-five hundred dollars (\$3,500). But at this time the trustees had decided to enlarge the bakery and build a new laundry. The committee contracted with them for the same, and agreed to pay thirty-five hundred dollars (\$3,500) whenever the expenditure should be made. The building has since been erected and the money paid. When all the plans were matured, some apprehension was felt that the work could not be done within the appropriation. This grew out of the large advance in labor and material, and the adverse opinions advanced by some practical builders. This led to the consideration of certain changes, chiefly in dispensing with certain features of ornamentation, whereby something could be saved, and yet not interfere with the general plan.

Proposals were solicited for a part or the whole of the work,

and for the work as specified or modified. A large number of sealed proposals were received after due notice had been given in the papers. These were opened May 24.

The committee found that they could contract with responsible parties without any material alteration of the plans or specifications.

Contracts were made as follows :

Watson Tryon, mason work, - - - -	\$52,557.69
J. W. Hubbard & Co., joiner work, - - -	32,811.63
A. M. Shew, superintendent "sewer," - - -	777.47
Walworth Manufacturing Co., steam-heating, -	7,990.75
George Maehl, plumbing, - - - -	3,720.00
Peter Amerman, boilers, - - - -	1,750.00
M. F. Clark & Co., slate-roofing, - - - -	4,700.00
	<hr/>
	\$104,307.54

The contracts were thought favorable for the State by practical men, and appeared so by the higher bidding of responsible parties. The sewer contract made with Dr. Shew, superintendent, called for a large amount of digging—a trench, altogether, 1,500 feet in length, and to a depth, in places, of 13 feet. This was done chiefly by the insane convicts, at a nominal cost to the State.

Other contracts are made as follows :

George Keller, Architect, . . .	\$3,000.00
A. W. Shay, "Kitchen," . . .	1,550.00
" " " "Furniture," . . .	7,621.85
Trustees of Hospital, "Laundry," . . .	3,500.00
C. B. Richards, Engineer, . . .	300.00
	<hr/>
	15,971.85

Leaving an unappropriated balance of \$9,720.61.

A careful list of all the articles needed for furnishing the building was prepared. Many of these could be made in the Asylum. The committee found that for this reason they could make a more favorable contract with the superintendent, and besides they would secure his valuable services in the matter of selection and supervision.

When the contracts had all been made with responsible parties to fully complete and furnish the building, and having a balance unappropriated which was deemed sufficient for all incidental and contingent expenses, the contractors were notified to begin work at once. Ground was broken about the middle of June. The work has been pushed forward with all reasonable dispatch. Some delay has been occasioned by the want of moulded brick, otherwise the buildings would have been entirely closed in. The early setting in of winter has also retarded the outside work.

All of the buildings are inclosed, with a single exception, and this one is nearly ready for the roof.

The steam heating apparatus is in, which will allow the inside finishing to go on.

The committee have given much personal attention to the building, though the work has been done under the general direction of the architect and under the immediate supervision of J. H. Sibley, a competent, practical builder.

The contractors have, as a general thing, fulfilled their contracts to the acceptance of the committee.

The buildings have been located at the south of the present Asylum, beginning at a distance of 138 feet, and on a line 40 feet east of the rear line of the present building. They consist of the center building, and the two wings joined to the center by a corridor. The middle building has a front of 103 feet and each wing 150 feet. The kitchen, store-rooms, and boiler-house are in the rear of the center building. The buildings are of brick, three stories in height. The first story of the center building will be for the dining halls, the second story for the resident physicians, offices and sewing-rooms, the upper story for attendants and nurses.

The clock-tower rises from the entrance of the center building. All the buildings have a steep, pitched roof. There will be accommodation for 262 patients, and more rooms can be made if needed.

The apartments contemplated in the resolution for the insane convicts are in the lower story of the south wing.

The additional contracts and expenditures made from June 1st to Dec. 22d are as follows.

Watson Tryon, "Additional,"	.	.	\$204.80	
" " "Laying closet floor,"	.	.	25.00	
" " "Coal Vault,"	.	.	917.75	
J. W. Hubbard & Co., "Additional,"	.	.	124.80	
A. M. Shew, Coal,	.	.	560.00	
" " "Additional Pipe,	.	.	141.75	
" " "Extra digging,	.	.	35.00	
J. H. Sibley,	.	.	875.25	
Committee, Disbursements,	.	.	204.18	
Sundries to Oct. 12th, 1880,	.	.	339.58	
S. C. Johnson & Co., "Iron Stairs,"	.	.	110.00	
Insurance,	.	.	125.00	
George Maehl, "Additional,"	.	.	201.02	3,864.13
Contracts,	.	.		104,307.54
Additional,	.	.		15,971.85
Unappropriated Balance, Dec. 22, 1880,				5,856.48
				<u>\$130,000.00</u>

The most important items are the contract for the coal vault, one hundred tons of coal, and the sum paid for supervision.

The contracts call for the completion of the buildings on the first of May next. There is every reason to believe that it will be completed on or about that time.

In the erection of these buildings the committee have kept in mind that they were designed for the indigent insane. The plans adopted contemplated every essential comfort without extravagant expenditure, and therefore little has been appropriated for ornamentation. The committee have aimed to build a durable structure, requiring in their contracts the best of work and the best of materials of every sort. And they have sought to provide, in the arrangements of every part, all the appliances desirable and necessary for the convenience and easy working of the institution. Should the roof-tower, or any part, be criticised as too expensive, it may be borne in mind that the cost per patient is only \$490, while in some other institutions the cost has reached as high as \$3,000 per patient. In view of this economy, and to relieve the otherwise plainness of the structure, the wisdom of the Legislature that

provided for thus much of ornamentation can hardly be questioned.

TABLE SHOWING THE COST, ETC., OF HOSPITALS FOR THE INSANE, ERECTED SINCE 1865.

Name.	State.	Cost.	No. of Patients.	Average Cost per Capita.
Danvers,	Mass.	\$1,609,718.89	500	\$3,219.43
Worcester,	"	1,162,577.77	450	2,583.50
Middletown,	Conn.	684,109.09	475	1,440.23
Hudson River,	N. Y.	1,697,665.08	300	5,658.88
Willard,	"	1,513,664.77	1,395	1,092.23
Buffalo,	"	1,096,352.71	232	4,725.65
Morristown,	N. J.	2,500,000.00	900	2,777.77
Danville,	Penn.	1,008,303.99	450	2,240.67
Warren,	"	900,000.00	450	2,000.00
Kalamazoo,	Mich.	653,899.00	580	1,127.00
Columbus,	Ohio.	1,520,199.17	500	3,040.40
Elgin,	Ill.	534,011.00	460	1,160.00
Oshkosh,	Wis.	552,597.00	559	988.54
Independence,	Iowa.	600,000.00	300	2,000.00
Middletown,*	Conn.	130,000.00	262	490.00

The receipts and expenditures up to Dec. 22, 1880, are as follows :

RECEIPTS.

From State of Connecticut, - - - \$69,689.97

EXPENDITURES.

H. E. Taintor, atty.,	-	-	\$100.00
Geo. Keller, architect,	-	-	20.00
C. B. Richards, mechanical engineer,	-	-	300.00
Phelps & Chatfield, "experts,"	-	-	15.00
Printing,	-	-	163.58
Committee expenses,	-	-	204.18
E. P. Augur, surveying, etc.,	-	-	42.00
A. M. Shew, sewer contract, etc.,	-	-	6,714.00
J. W. Hubbard & Co., joiner contract,	-	-	11,440.59
Watson Tryon, masonwork contract,	-	-	38,289.37

* Additional buildings.

J. H. Sibley, salary, etc.,	-	-	\$875.25
Geo. Maehl, plumbing contract,	-	-	1,542.00
Trustees of Hospital, laundry contract.	-	-	3,500.00
Loveland, carriage-hire,	-	-	19.00
Peter Amerman, boiler contract,	-	-	1,750.00
W. F. Clark & Co., slate roof contract,	-	-	2,500.00
C. C. Kimball & Co., insurance,	-	-	125.00
S. C. Johnson & Co., iron stairs,	-	-	110.00
			<hr/>
			\$69,689.97

[Copy of Auditors' Certificate.]

HARTFORD COUNTY, ss., HARTFORD, Dec. 22d, 1880.

We hereby certify that we have examined the foregoing account and find the same duly vouched and correct.

(Signed) GREENE KENDRICK,
J. C. HAMMOND, JR.,

Auditors of institutions aided by appropriations.

All of which is respectfully submitted.

M. STORRS,
W. J. ATWATER,
CHAS. G. R. VINAL.

REPORT
OF THE
JOINT STANDING COMMITTEE
ON
HUMANE INSTITUTIONS
ON
House Joint Resolution No. 161,
de
INSANE ASYLUM AT MIDDLETOWN.

Printed by Order of the Legislature.

HARTFORD, CONN.:
PRESS OF THE CASE, LOCKWOOD & BRAINARD COMPANY.
1881.

REPORT.

GENERAL ASSEMBLY,
JANUARY SESSION, A. D. 1881.

The Joint Standing Committee on Humane Institutions, to whom was referred House Joint Resolution No. 161, being a resolution, "That a commission consisting of three persons, one of whom shall be an expert book-keeper, be appointed by the Governor to make a thorough investigation of the financial affairs and general business management of the Insane Asylum at Middletown, to report to the next General Assembly," beg leave to report:

That, after the said Committee received the resolution, they made every effort to procure the appearance of any and all persons who might be able to furnish any information which would show cause why a commission should be appointed. As various rumors had been set afloat relative to the financial management of said institution, and as the names of several gentlemen had been connected with the rumors, the Committee made personal application to these gentlemen, who, in answer to enquiries, expressed themselves as having the fullest confidence in every officer connected with the Asylum, and furthermore gave it as their opinion that an investigation of the management and business affairs of the Asylum would result in a full and complete exoneration from the slightest suspicion of every officer in any way connected with said institution, and concluded by saying, in substance, that they believed the Insane Asylum at Middletown was conducted upon a sound business basis and for the best interests of the state. At the third hearing of the Committee, a gentleman who has audited the accounts of the institution for the past

five years appeared and gave substantial testimony in favor of the present management.

Previous to the last hearing relative to this matter, the Committee gave an extended notice to the members of both branches of this Assembly of the time and place for a final hearing, and at the same time requested any member of the General Assembly who could furnish information, or could furnish to the Committee any facts which would lead to information concerning this matter, to do so. When the time for said hearing arrived no person appeared.

Furthermore, the Committee have made a personal investigation, and have arrived at these conclusions:

That the said Insane Asylum is managed upon strict and sound business principles; that they have the fullest confidence in the integrity of the managers and officers; they firmly believe that if a commission were appointed for the purpose mentioned in the resolution, it would be casting unjust reflection upon honorable and trustworthy gentlemen, who are filling the positions which they occupy with great credit to themselves and with true fidelity to the state.

The Committee are, therefore, unanimously of the opinion that the resolution ought not to pass.

Respectfully submitted,

M. W. PEMBER,

Chairman on the part of the House, for the Committee.

STATE OF CONNECTICUT.

ANNUAL REPORT

OF

The Connecticut Agricultural

EXPERIMENT STATION

For 1880.

PRINTED BY ORDER OF THE LEGISLATURE.

NEW HAVEN:
TUTTLE, MOREHOUSE & TAYLOR, PRINTERS.
1881.

OFFICERS

OF

The Connecticut Agricultural Experiment Station,

1880.

STATE BOARD OF CONTROL.

	HIS EXC. C. B. ANDREWS, Litchfield, <i>President.</i>	<i>Ex-officio.</i>
	HON. E. H. HYDE, Stafford, <i>Vice-President.</i>	Term expires, 1882.
	PROF. W. O. ATWATER, Middletown.	" 1882.
	T. S. GOLD, West Cornwall.	" 1883.
	EDWIN HOYT, New Canaan.	" 1880.
<i>Executive Committee.</i>	{ JAMES J. WEBB, Hamden.	" 1881.
	{ W. H. BREWER, New Haven, <i>Sec'y and Treas.</i>	" 1881.
	{ S. W. JOHNSON, New Haven, <i>Director.</i>	<i>Ex-officio.</i>

Chemists.

E. H. JENKINS, PH.D.

H. P. ARMSBY, PH.D.

H. L. WELLS, PH.B., to July, 1880.

C. A. HUTCHINSON, B.S., since Sept., 1880.

His Exc. Hobart B. Bigelow, of New Haven, is President of the Board of Control for 1881. The other officers for 1881 are as above.

ANNOUNCEMENT.

THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION was established in accordance with an Act of the General Assembly, approved March 21, 1877, "for the purpose of promoting Agriculture by scientific investigation and experiment."

The Station is prepared to analyze and test fertilizers, cattle-food, seeds, soils, waters, milks, and other agricultural materials and products, to identify grasses, weeds, and useful or injurious insects, and to give information on the various subjects of Agricultural Science, for the use and advantage of the Citizens of Connecticut.

The Station makes analyses of Fertilizers and Seed-Tests for the Citizens of Connecticut *without charge*, provided—

1. That the results are of use to the public and are free to publish.
2. That the samples are taken by *consumers* from stock now in the market, and in accordance with the Station instructions for sampling.
3. That the samples are fully described on the Station "Forms for Description."


All work proper to the Experiment Station that can be used for the public benefit, will be made without charge. Work done for the use of individuals will be charged for at moderate rates. The Station will undertake no work, the results of which are not at its disposal to use or publish, if deemed advisable for the public good.


Samples of Commercial Fertilizers, Seeds, etc., will be examined in the order of their coming; but when many samples of one brand or kind are sent in, the Station will make a selection for analysis.

The results of each analysis or examination will be promptly communicated to the party sending the sample. Results that are of general interest will be sent simultaneously to all the newspapers of the State for publication.

The officers of the Station will take pains to obtain for analysis samples of all the commercial fertilizers sold in Connecticut; but the organized coöperation of the farmers is essential for the full and timely protection of their interests. Farmers' Clubs and like Associations can efficiently work with the Station for this purpose, by sending in samples early during each season of trade.

It is the wish of the Board of Control to make the Station as widely useful as its resources will admit. Every Connecticut citizen who is concerned in agriculture, whether farmer, manufacturer, or dealer, has the right to apply to the Station for any assistance that comes within its province to render, and the Station will respond to all applications as far as lies in its power.

 Instructions and Forms for taking samples, and Terms for testing Fertilizers, Seeds, etc., for private parties, sent on application.

 Parcels by Express, to receive attention, should be prepaid, and all communications should be directed to

AGRICULTURAL EXPERIMENT STATION,

NEW HAVEN, CONN.

P. O. Box, 945.

Laboratory and Office, in East Wing of Sheffield Hall, Grove St., head of College St.

CONTENTS.

	Page
Officers of the Station,	2
Announcement,	3
Contents,	4
Report of the Board of Control,	7
Report of the Treasurer,	8
Report of the Director,	9
Summary of Station Work,	9
Station Bulletins,	10
Present Resources of the Station,	10
Wants of the Station,	10
Experimental Ground,	11
Plant House,	12
Working Reference Library,	13
Commercial Fertilizers,	13
Instructions for Sampling,	14
Form for Description,	16
Explanations of Analysis and Valuation,	17
Nitrogen, Organic,	17
Ammonia,	17
Nitric Acid,	17
Phosphoric Acid, soluble,	18
" " reverted,	18
" " insoluble,	18
Potash,	18
Valuation defined,	18
Average Trade-Values for 1879 and 1880,	19
Estimating the Value of a fertilizer,	19
Uses of Valuation,	20
The Agricultural Value of a fertilizer,	20
Trade Values for 1881,	21
Analyses and Valuation of Fertilizers,	21
Superphosphates, Guanos, etc.,	22
Tables of Analysis and Valuation,	24-25
Comparison of different samples of the same Brand,	26
Pollard's Privy Guano,	26
Bone Manures,	28
Method of Valuation,	28
Analyses,	30
Dried Blood and Tankage,	34

	Page
Report of the Director: Analyses and Valuation of Fertilizers—	
Fish Scrap or Fish Guano,	35
Buffalo Horn Shavings,	36
Castor Pomace and Cotton Seed Meal,	36
Sulphate of Ammonia,	37
Nitrate of Soda,	38
Potash Salts,	38
Wood Ashes, unleached and leached,	39
Land Plaster,	41
Products of Salt Manufacture,	42
Stable Manure, from New York City,	43
Vegetable Ivory Sawdust and Turnings,	44
Special Fertilizers, Forrester, Bowker, Stockbridge, Matfield,	45
Table of analyses and valuation,	46, 47
Comparison of analyses with Guarantees,	48
Comparison of special manures according to brand and crop,	50-51
Cost of Active Ingredients of Fertilizers during 1880,	49
Organic Nitrogen,	49
Nitrogen in the form of Ammonia Salts and Nitrates,	49
Soluble Phosphoric Acid,	52
Reverted " " 	52
Insoluble " " 	52
Potash,	52
Swamp Muck and Peat,	52
Table of Analyses of Swamp Muck, fifteen samples,	54
Barrenness of, due to iron-salts,	55
Experiments on the Effects of Alkalies in Developing the Fertilizing	
Power of Peat,	58
Influence of Lime on the Effect of Fertilizers,	60
Relative Fertilizing Value of Soluble and Reverted Phosphoric Acid, ..	60
Leather Chips,	65
Professor Storer's Experiments,	66
Apple Pomace,	67
Soils,	67
Barren Earth from under stable,	69
Analyses,	70, 71
Action of excess of Urine,	71
Florida Magnesian Limestone,	73
Fodder and Feeding Stuffs,	74
List of Feeding Stuffs Analyzed,	74
Manual of Cattle Feeding by Dr. H. P. Armsby,	74
Explanations of Analyses, etc.,	74
Money Values,	75
Albuminoids and Carbohydrates, use in Food,	75, 76
Table of Composition, etc., of Feeding Stuffs,	78
Maize and Maize Meal, description of nine samples analyzed,	79
Water-Content of Market Corn,	79
Analyses,	81

	Page
Report of the Director: Fodder and Feeding Stuffs—	
Comparative Value of the Corn Meal and shelled Corn in Market,	82
On choice of Varieties of Maize,	83
Hay,	83
Analyses,	83
Remarks on Analyses by Dr. Armsby,	84
Cotton Seed Meal,	84
Wheat Flour,	85
Dust of Vegetable Ivory,	86
Kiln-Dried Brewers' Grains,	87
Comparison with Oats,	88
Poisons,	89
London Purple,	89
The West Avon Poison Case,	89
Symptoms of Cattle poisoned by oxalic acid,	89
Paris Green on Corn Stalks,	90
What becomes of the Rain Fall?	
Its Evaporation and Percolation. Inquiry by J. M. Hubbard, Esq.,	91
Answer,	92
The lysimeter, invented by Dalton,	92
Observations on percolation by Dickinson,	93
" " Dalton,	93
" " Greaves,	93
" " Lawes and Gilbert,	93
" " Dr. Sturtevant,	94
" " Prof. Stockbridge,	94
" " Dr. Wollny,	94
Seed Tests,	96
Instructions for Sampling Seeds,	100
Form for Description of Seeds,	101
Form for Report of Seed Tests,	102
Determination of Phosphoric Acid in Commercial Fertilizers,	103
Determination of Phosphoric Acid in Citric Solution,	104
Comparisons between the Citric and Molybdic methods,	112
Law Concerning sale of Fertilizers,	115
Act Establishing Connecticut Agricultural Experiment Station,	116
Act relating to Printing Reports,	118
Index,	119-122

REPORT OF THE BOARD OF CONTROL.

To the General Assembly of the State of Connecticut:

GENTLEMEN:—The Board of Control of THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION herewith submits to your Honorable Body the Annual Reports of the Director and Treasurer made to this Board at its Annual Meeting held in Hartford, January 18th, 1881.

With the presentation of these Reports we beg leave to state that the work of the Station during the year has gone on without interruption, under the direction of Professor S. W. Johnson, assisted the whole year by Dr. E. H. Jenkins and Dr. H. P. Armsby, and a part of the year by Mr. H. L. Wells and Mr. C. A. Hutchinson. Dr. R. H. Chittenden has also assisted in some special investigations pertaining to animal poisoning.

The Board has held one meeting and its Executive Committee seven meetings during the year.

The last Report of the Experiment Station, by an arrangement with the Board of Agriculture and with the approval of the Comptroller, was bound with the printed Report of that Board and the two were distributed together from the office of the Secretary of the Board of Agriculture at Hartford. That arrangement has been so satisfactory that it is continued this year.

By order of the Board of Control.

HOBART B. BIGELOW,
President.

WILLIAM H. BREWER,
Secretary.

REPORT OF THE TREASURER.

WM. H. BREWER, *in account with The Connecticut Agricultural Experiment Station.*

RECEIPTS.

Balance from account of 1879,	\$527.71
Laboratory Receipts,	371.45
From State Treasurer,	5,000.00
	<hr/> \$5,899.16

PAYMENTS.

Salaries,	\$3,967.50
Travelling expenses of the Board,	57.29
Printing, Stationery and Postage,	287.75
Gas,	91.96
General Laboratory Expenses,	1,108.55
Furniture, Repairs and Fixtures,	214.96
Miscellaneous,	38.59
Cash on hand,	132.56
	<hr/> \$5,899.16

There is due the Station for Laboratory work, one hundred fifty-eight (158) dollars, which added to the cash on hand, amounts to two hundred and ninety (290) dollars. The bills outstanding against the Station will fully equal that amount.

The Station is in possession of office furniture, apparatus, laboratory stock, seed, plant and other collections, tools, appliances, etc., estimated to be worth thirteen hundred (1300) dollars. That is, it would take that sum or more to replace them or their equivalent.

WM. H. BREWER,
Treasurer.

NEW HAVEN, Jan. 17th, 1881.

T. S. GOLD,
W. O. ATWATER, } *Auditing Committee.*

REPORT OF THE DIRECTOR.

The pages that follow contain the Fourth Annual Report on the work of this Station, and give an account of its operations for the year 1880.

The Objects and Uses of the Station, and the Privileges which it offers to the citizens of Connecticut, are concisely set forth in the Announcement which is to be found on page 3.

The most important subjects which have engaged attention at the Station during the year 1880, are briefly stated in the paragraphs that immediately follow. Reference to the Table of Contents will direct to their details and show what other topics are considered in this Report.

The analysis and valuation of *Commercial Fertilizers* continues to be the most engrossing employment of the Station. During the eleven months ending Dec. 1, 1880, one hundred and forty-one (141) samples of such fertilizers have been analyzed. Twenty (20) analyses have been made of *Swamp Mucks, Soils and Rocks*. Of *Fodder and Feeding Stuff's*, seventeen (17) samples have been examined.

Seven (7) *River and Well Waters* have been tested as to their sanitary condition.

Five (5) specimens of *Market Butter* were analyzed for the purpose of ascertaining whether this article is subject to adulteration.

Four (4) *Vinegars* were tested as to strength and for adulterations.

Nine (9) samples of *Bread* have been examined for alum.

Five (5) poison tests have been made, viz: on a sample of London purple, on corn stover that had been sprinkled when young with Paris Green, and on the stomachs, kidneys or urine of animals that died of poison or under suspicion of it.

In addition to the above specified two hundred and eight (208) analyses, a large amount of work has been done in further study of methods of determining phosphoric acid in quantitative analysis.

Sixty-five (65) *Seed* tests have also been made for the Trade.

Station Bulletins—Fourteen in number—have been printed and sent to each of the eighty-two newspapers published in the State, and also to the Secretaries of the thirty-one Agricultural Societies and twenty-six Farmers' Clubs of Connecticut. The Bulletins have also been supplied by way of exchange to many of the Agricultural Periodicals published in the New England and Middle States, and are regularly re-printed in several of the most widely circulated of these journals. Those who wish to see all of these Bulletins, and at the earliest moment, can find them in the *CONNECTICUT FARMER*, published weekly at Hartford, to the editor of which I must express my obligations for their first printing and for supplying copies of them for the use of the Station, at a small cost.

After conducting the work of this Station for three and one-half years, I feel it a duty to lay before the General Assembly and the citizens of the State some statements regarding its present efficiency as contrasted with the work which I conceive it ought to accomplish and might easily perform with a moderate increase of its resources.

The Present Resources of the Station.—In its present organization the locality of the Connecticut Agricultural Experiment Station consists of two apartments sixteen by thirty feet, besides an entrance hall, and a small closet, all loaned for its use. One of these larger rooms is its chemical laboratory, the other its office and writing room. Its property consists of the most essential chemical apparatus needed for analytical work and the simplest office furniture and requisites. It has no land and no place where any experiments on soils, plants or animals, under agricultural conditions, can be set up or carried out. The Station owns no books except its own manuscript records, a few copies of its printed Reports and a few volumes of agricultural journals and transactions received in way of exchange.

That the Station thus lives in borrowed lodgings, without grounds or opportunities for agricultural experiments, is not the plan or desire of the Board of Control, but has been necessitated by the limited means at its disposal.

The Wants of the Station.—In its present shape the Station is quite strictly confined to those investigations which can be made in the chemical laboratory, but is debarred from any systematic or serviceable experimental study of the very numerous and most important questions which relate to the wants of soils, crops, or

domestic animals, a study which would require ground and the simpler appliances that are employed in practical agriculture.

The analysis of Commercial Fertilizers, which so largely occupies the working force of the Station, accomplishes a single though highly useful purpose, viz: to enable the farmer to know the composition and approximate commercial value of the costly manures that are so largely consumed in our State.

But what is equally important is to know the agricultural value of these fertilizers or their elements, and their economical adaptation to various soils, crops or circumstances. Numerous inquiries are constantly addressed to the Station relating to these topics, to which in many cases no satisfactory answer can be given. In most instances, however, suitably conducted practical experiments would make it possible to answer these inquiries more or less perfectly, and to make valuable additions to our store of knowledge. There are two methods of making such experiments. They may be carried out on a farming scale for a series of years, as has been done at a few places in Europe, notably by Mr. Lawes of England; but thus conducted, their expense is so great and so long a time must usually pass before the useful results appear, that this method is not open to the Experiment Station unless it were transferred to a farm, and provided with five or six times its present amount of funds. Another plan is to make experiments on a small scale in pots or boxes. This method has indeed some drawbacks, but very many advantages. It requires but little ground. By use of a greenhouse, in this sunny climate, experiments may be carried on nearly throughout the year, their number may be cheaply multiplied and results got in a comparatively short time. Furthermore, the influence of disturbing causes, excess or lack of rain or warmth, the ravages of birds and insects, may be more perfectly avoided. By this method a large number of experiments have been made and are constantly making in the European Stations and in this country. Prof. Storer at the Bussey Institution, Dr. McMurtrie at the Department of Agriculture, Washington, and the writer have obtained useful results by its means.

On subsequent pages is given an account of some efforts to ascertain how the nitrogen of swamp muck becomes available to plants, which illustrate the value of this plan of experiment.

To carry on such experiments as a part of Station work would require that the Station should have control of a plot of ground of one or several acres in extent, with unobstructed exposure to

sun, and so enclosed as effectually to exclude all intrusion from man and beast.

Furthermore, there would be needed a suitable glass plant-house, with heating arrangements, water, etc., and a skillful gardener would have to be added to the working force of the Station.

The seedsmen of our State are beginning to call upon the Station to test the vitality and purity of their seeds, and to do this at the proper time (in winter) and to the extent which is soon likely to be demanded, a special seed laboratory will be absolutely necessary.

This experimental ground, furthermore, should be the site of the Station Laboratory, because the experiments to be conducted there would require more or less chemical work to be done in preparing for them and in elaborating their results, and would demand the constant oversight of the Director and his assistants throughout all their duration.

The Station should also have lodgings for its gardener and for other responsible assistants within its enclosure, to ensure the undisturbed progress of its investigations.

The Station grounds with these buildings cannot be placed beyond the reach of illuminating gas and water-service pipes, without extreme inconvenience to its garden and laboratories. The Station should therefore be permanently located in some city suburb where it will also be readily accessible to the Post, Express and Telegraph Offices. The chemical laboratory of the Station ought to consist of a room somewhat larger than that now occupied, and should have adjoining a capacious store-room and a smaller furnace room. In connection with its office should be suitable accommodation for a considerable library. It would be extremely desirable also to have space for preserving and displaying specimens of objects having agricultural interest, which fall in the line of its investigations, viz: samples of the seeds of useful and injurious plants and a collection of such plants as might be useful for purposes of comparison and identification. The Station has already in its possession a small but valuable collection of seeds, and a pretty complete herbarium of the grasses and sedges of New England. Samples of rocks, soils, crude and native fertilizing materials and agricultural products of various kinds could readily be kept as an instructive exhibition, if but the place were provided.

A plain brick building with the capacity of a large dwelling house would give the Station good accommodation in all these respects.

To carry on the Station thus equipped in a manner commensurate with the interests involved would require some increase of its funds, for several purposes.

1. To enlarge its laboratory outfit, which is barely sufficient for the analytical work it has had to do, but ought to be considerably extended for profitable working.

2. To establish a working reference library. The Station must be vitally defective unless those who labor in it can have ready and constant access to all the special books, journals and Reports which record the results of investigations in the Experiment Stations of other States and Countries.

3. The Station will need a larger fund for current expenses so soon as it begins to experiment in the field, garden and plant-house.

COMMERCIAL FERTILIZERS.*

In respect to its terms, the Station makes two classes of analyses of fertilizers and fertilizing materials; the first for the benefit of farmers, gardeners, and the public generally; the second for the private use of manufacturers and dealers. Analyses of the first class are made gratuitously, and the results are published as speedily and widely as possible for the guidance of purchasers and consumers. Those of the second class are charged for at moderate rates, and their results are not published in a way to interfere with their legitimate private use. The Station, however, distinctly reserves the liberty to use, at discretion, all results obtained in its Laboratory, for the public benefit, and in no case will enter into any privacy that can work against the public good.

During 1880, one hundred and forty-one (141) samples of fertilizers have been analyzed. Of these, 33 were examined for private parties, and the remainder, 108, for the general use of the citizens of the State.

The samples analyzed for the public benefit have been sent in from various quarters of the State, in most instances by actual purchasers and consumers, but in some instances, by dealers or agents.

* The matter of this and of several subsequent pages explanatory of the sampling and valuation of fertilizers, is copied with a few appropriate alterations from the Report for 1879.

All the analyses of the first class are made on samples understood to have been taken in accordance with the printed Instructions which the Station supplies to all applicants. Here follows a copy of these instructions.

INSTRUCTIONS FOR SAMPLING COMMERCIAL FERTILIZERS.

The *Commercial Value* of a high priced Fertilizer can be estimated, if the amounts *per cent.* of its principal fertilizing elements are known. Chemical analysis of a small sample, so taken as to fairly represent a large lot, will show the composition of the lot. The subjoined instructions, if faithfully followed, will insure a fair sample. Especial care should be observed that the sample neither gains nor loses *moisture* during the sampling or sending, as may easily happen in extremes of weather, or from even a short exposure to sun and wind, or from keeping in a poorly closed vessel.

1. Provide a tea cup, some large papers, and for each sample a glass fruit-can or tin box, holding about one quart, that can be tightly closed, all to be clean and dry.

2. Weigh separately at least three (3) average packages (barrels or bags) of the fertilizer, and enter these *actual weights* in the "Form for description of Sample."

3. Open the packages that have been weighed, and mix well together the contents of each, down to one-half its depth, emptying out upon a clean floor if needful, and crushing any soft, moist lumps in order to facilitate mixture, but leaving hard, dry lumps unbroken, so that the sample shall exhibit the texture and mechanical condition of the fertilizer.

4. Take out five (5) equal cupfuls from different parts of the mixed portions of each package. Pour them (15 in all) one over another upon a paper, intermix again thoroughly but quickly to avoid loss or gain of moisture, fill a can or box from this mixture, close tightly, *label plainly*, and send, charges prepaid, to

The Conn. Agricultural Experiment Station, New Haven, Conn.

The foregoing instructions may be over-nice in some cases, but they are not intended to take the place of good sense on the part of those who are interested in learning the true composition of a fertilizer. Any method of operating that will yield a *fair sample* is good enough.

In case of a fine, uniform and moist or coherent article, a butter-tryer or a tin tube, like a dipper handle, put well down into the packages in a good number of places will give a fair sample with great ease. With dry, coarse articles, such as ground bone, there is likely to be a separation of coarse and fine parts on handling. Moist articles put up in bags or common barrels may become dry on the outside. It is in these cases absolutely necessary to mix thoroughly the coarse and fine, the dry and the moist portions before sampling. Otherwise the analysis will certainly misrepresent the article whose value it is intended to fix.

The quantity sent should not be too small. When the material is fine and uniform, and has been carefully sampled, a pint may be enough, but otherwise and especially in case of ground bone, which must be mechanically analyzed, the sample should not be less than one quart.

It is also important that samples for analysis should be taken at the time when the fertilizer is purchased, and if they cannot be at once dispatched to the Station, they should be so preserved as to suffer no change. Moist fish, blood or cotton seed will soon decompose and lose ammonia, if bottled and kept in a warm place. Superphosphates containing much nitrogen will suffer reversion of their soluble phosphoric acid under similar circumstances. Most of the moist fertilizers will lose water unless tightly bottled, but some of the grades of potash salts will gather moisture from the air and become a slumpy mass if not thoroughly protected.

These changes in the composition of a sample not suitably preserved, must invalidate any conclusions from its analysis, and work serious injustice either to the manufacturer or to the consumer.

It doubtless often happens that a purchaser on laying in a stock of fertilizers, decides that he will not then trouble the Station to analyze the goods he has obtained, but will set aside samples which he can send for examination in case the crops report adversely as to their quality. It is always better to send all samples at once to the Station where they can be directly analyzed or so prepared, that they shall keep without chemical change.

With the Instructions for Sampling, the Station furnishes a blank Form for Description of Samples, a copy of which is here given.

FORM FOR DESCRIPTION OF SAMPLE.

Station No. Rec'd at Station, 18

Each sample of Fertilizers sent for gratuitous analysis must be accompanied by one of these Forms, with the blanks *below* filled out fully and legibly.

The filled out Form, if wrapped up with the sample, will serve as a label.

Send with each sample a specimen of any printed circular, pamphlet, analysis, or statement that accompanies the fertilizer or is used in its sale. .

Brand of Fertilizer,

Name and address of Manufacturer,

Name and address of Dealer from whose stock this sample is taken,

Date of taking this sample,

Selling price per ton or hundred, bag or barrel,

Selling weight claimed for each package weighed,

Actual weight of packages opened,

Here write a copy of any analysis or guaranteed composition that is fixed to the packages.

Signature and P. O. address of person taking and sending the sample.

On receipt of any sample of fertilizer from the open market, the filled out "Form for Description," which accompanies it is filed in the Station's Record of Analyses and remains there as a voucher for the authenticity of the sample and for the fact that it has been taken fairly, or, at least under suitable instructions. It is thus sought to insure that manufacturers and dealers shall not suffer from the publication of analyses made on material that does not correctly represent what they have put upon the market.

The "Form for Description" when properly filled out, also contains all the data of cost, weight, etc., of a fertilizer which are necessary for estimating, with help of the analysis, the commercial value of its fertilizing elements, and the fairness of its selling

price. Neglect to give full particulars occasions the Station much trouble, and it is evident that want of accuracy in writing up the Description may work injustice to manufacturers or dealers as well as mislead consumers. It is especially important that the *Brand* of a fertilizer and its *Selling price* should be correctly given. The price should be that actually charged by the dealer of whom it is bought, and if the article be purchased in New York or other distant market, that fact should be stated and the cost at the nearest point to the consumer, on rail or boat, should be reported also.

In all cases, when possible, *ton-prices* should be given, and if the sale of an article is only by smaller quantities, that fact should be distinctly mentioned.

When a sample of fertilizer has been analyzed, the results are entered on a printed form, which is filed in the Station Record of Analyses, facing the "Description of Sample" that was received with the fertilizer to which it pertains, and there remains for future reference.

A copy of the analysis is also immediately reported to the party that furnished the sample, the report being entered on one page of another printed form and facing a second printed page of "Explanations" intended to embody the principles and data upon which the valuation of fertilizers is based.

These Explanations are essential to a correct understanding of the analyses that are given on subsequent pages and are therefore reproduced here, as follows:

EXPLANATIONS OF FERTILIZER-ANALYSIS AND VALUATION.

Nitrogen is commercially the most valuable fertilizing element. It occurs in various forms or states. *Organic nitrogen* is the nitrogen of animal and vegetable matters generally, existing in the albumin and fibrin of meat and blood, in the uric acid of bird dung, in the urea and hippuric acid of urine, and in a number of other substances. Some forms of organic nitrogen, as that of blood and meat, are highly active as fertilizers; others, as that of hair and leather, are comparatively slow in their effect on vegetation unless these matters are reduced to a fine powder or chemically disintegrated. *Ammonia* and *nitric acid* are results of the decay of *organic nitrogen* in the soil and manure heap, and are

the most active forms of Nitrogen. They occur in commerce—the former in sulphate of ammonia, the latter in nitrate of soda. 17 parts of ammonia contain 14 parts of nitrogen.

Soluble Phosphoric acid implies phosphoric acid or phosphates that are freely soluble in water. It is the characteristic ingredient of Superphosphates, in which it is produced by acting on “insoluble” or “reverted” phosphates with oil of vitriol. It is not only readily taken up by plants, but is distributed through the soil by rains. Once well incorporated with soil it shortly becomes reverted phosphoric acid.

Reverted (reduced or precipitated) Phosphoric acid, strictly means phosphoric acid that was once freely soluble in water, but from chemical change has become insoluble in that liquid. It is freely taken up by a strong solution of ammonium citrate, which is therefore used in analysis to determine its quantity. “Reverted phosphoric acid” implies phosphates that are readily assimilated by crops, but generally have less value than soluble phosphoric acid, because they do not distribute freely by rain.

Insoluble Phosphoric acid implies various phosphates not freely soluble in water or ammonium citrate. In some cases the phosphoric acid is too insoluble to be rapidly available as plant food. This is true of South Carolina rock phosphate, of Navassa phosphate, and especially of Canada apatite. The phosphate of coarse raw bones is at first nearly insoluble in this sense, because of the animal matter of the bone which envelopes it, but when the latter decays in the soil, the phosphate remains in essentially the “reverted” form.

Potash signifies the substance known in chemistry as potassium oxide, which is the valuable fertilizing ingredient of “potashes” and “potash salts.” It is most costly in the form of sulphate, and cheapest in the shape of muriate or chloride.

The Valuation of a Fertilizer signifies estimating its worth in money, or its trade-value; a value which it should be remembered, is not necessarily proportional to its fertilizing effects in any special case.

Plaster, lime, stable manure and nearly all of the less expensive fertilizers have variable prices, which bear no close relation to their chemical composition, but guanos, superphosphates and other fertilizers, for which \$30 to \$80 per ton are paid, depend chiefly for their trade-value on the three substances, *nitrogen*, *phosphoric acid* and *potash*, which are comparatively costly and steady in

price. The money-value per pound of these ingredients is easily estimated from the market prices of the standard articles which furnish them to commerce.

The average Trade-values or cost in market per pound, of the ordinarily occurring forms of nitrogen, phosphoric acid and potash, as found in the Connecticut and New York markets, and employed by the Station during 1879 and 1880, have been as follows :

TRADE-VALUES FOR 1879 and 1880.—See page 21.

	Cents per pound.
Nitrogen in nitrates,	26
“ in ammonia salts,	22½
“ in Peruvian Guano, fine steamed bone, dried and fine ground blood, meat and fish,	20
“ in fine ground bone, horn and wool dust,	18
“ in fine medium bone,	17½
“ in medium bone,	16½
“ in coarse medium bone,	15½
“ in coarse bone, horn shavings, hair and fish scrap,	15
Phosphoric acid soluble in water,	12½
“ “ “reverted” and in Peruvian Guano,	9
“ “ insoluble, in fine bone and fish guano,	7
“ “ “ in fine medium bone,	6½
“ “ “ in medium bone,	6
“ “ “ in coarse medium bone,	5½
“ “ “ in coarse bone, bone ash and bone black, ----	5
“ “ “ in fine ground rock phosphate,	3½
Potash in high grade sulphate,	7½
“ in low grade sulphate and kainite,	6
“ in muriate or potassium chloride,	4½

These “trade-values” of the elements of fertilizers are not fixed, but vary with the state of the market, and are from time to time subject to revision. They are not exact to the cent or its fraction, because the same article sells cheaper at commercial or manufacturing centers than in country towns, cheaper in large lots than in small, cheaper for cash than on time. These values are high enough to do no injustice to the dealer, and properly interpreted, are accurate enough to serve the object of the consumer.

To Estimate the Value of a Fertilizer we multiply the per cent. of Nitrogen, etc., by the trade-value per pound, and that product by 20, we thus get the values per ton of the several ingredients, and adding them together we obtain the total estimated value per ton.

In case of *Ground bone*, the fineness of the sample is graded by sifting, and we separately compute the nitrogen value of each grade of bone which the sample contains, by multiplying the pounds of nitrogen per ton in the sample, by the per cent. of each grade, taking one one-hundredth of that product, multiplying it by the estimated value per pound of nitrogen in that grade, and taking this final product as the results in cents. Summing up the separate values of each grade, thus obtained, together with the values of each grade for phosphoric acid, similarly computed, the total is the estimated value of the sample of bone. For further particulars, see page 28.

The uses of the "Valuation" are, 1st, to show whether a given lot or brand of fertilizer is worth as a commodity of trade what it costs. If the selling price is no higher than the estimated value, the purchaser may be quite sure that the price is reasonable. If the selling price is but \$2 to \$3 per ton more than the estimated value it may still be a fair price, but if the cost per ton is \$5 or more over the estimated value, it would be well to look further. 2d, Comparisons of the estimated values and selling prices, of a number of fertilizers, will generally indicate fairly which is the best for the money. But the "estimated value" is not to be too literally construed, for analysis cannot always decide accurately what is the *form* of nitrogen, etc., while the mechanical condition of a fertilizer is an item whose influence cannot always be rightly expressed or appreciated.

The Agricultural value of a fertilizer is measured by the benefit received from its use, and depends upon its fertilizing effect, or crop-producing power. As a broad, general rule, it is true that Peruvian guano, superphosphates, fish-scraps, dried blood, potash salts, plaster, etc., have a high agricultural value which is related to their trade-value, and to a degree determines the latter value. But the rule has many exceptions, and in particular instances the trade-value cannot always be expected to fix or even to indicate the agricultural value. Fertilizing effect depends largely upon soil, crop and weather, and as these vary from place to place and from year to year, it cannot be foretold or estimated except by the results of past experience, and then only in a general and probable manner.

For the above first-named purpose of valuation, the trade-values of the fertilizing elements which are employed in the computations, should be as exact as possible and should be frequently corrected

to follow the changes of the market. For the second-named use of valuation, frequent changes of the trade-values are disadvantageous, because two fertilizers cannot be compared as to their relative money-worth, when their valuations are estimated from different data. The greatest good of the greatest number is best served, in an Annual Report, by a middle course, especially since, in such a document, the fluctuations in trade-value that may occur within the year, cannot be accurately followed, and the comparisons of estimated values are mostly in retrospect.

For the year 1881 it is proposed to employ the following revised Trade-Values :

TRADE-VALUES FOR 1881.—*See page 49.*

	Cents per pound.
Nitrogen in nitrates,-----	26
“ in ammonia salts,-----	22½
“ in Peruvian Guano, fine steamed bone, dried and fine ground blood, meat and fish, superphosphates and special manures,-----	20
“ in coarse or moist blood, meat or tankage, in cotton seed, linseed and Castor Pomace,-----	16
“ in fine ground bone, horn and wool dust,-----	15
“ in fine medium bone,-----	14
“ in medium bone,-----	13
“ in coarse medium bone,-----	12
“ in coarse bone, horn shavings, hair and fish scrap,-----	11
Phosphoric acid soluble in water,-----	12½
“ “ “reverted” and in Peruvian Guano,-----	9
“ “ insoluble, in fine bone and fish guano,-----	6
“ “ “ in fine medium bone,-----	5½
“ “ “ in medium bone,-----	5
“ “ “ in coarse medium bone,-----	4½
“ “ “ in coarse bone, bone ash and bone black,-----	4
“ “ “ in fine ground rock phosphate,-----	3½
Potash in high grade sulphate,-----	7
“ in low grade sulphate and kainite,-----	5½
“ in muriate or potassium chloride,-----	3½

The reasons for these changes are to be found in subsequent pages.

ANALYSES AND VALUATION OF COMMERCIAL FERTILIZERS.

The Commercial fertilizers analyzed in the Station Laboratory during the year 1880, are as follows, viz :

38 superphosphates and guanos.

2 Pollard's Privy Guano.

- 15 ground bone.
- 17 dried blood, etc.
- 16 dried fish scrap.
 - 1 horn shavings.
- 5 castor pomace and cotton seed meal.
- 4 sulphate of ammonia.
- 1 nitrate of soda.
- 8 potash salts.
- 1 leached wood ashes.
- 1 unleached wood ashes.
- 3 plaster.
- 3 salt kiln-refuse and salt washings.
- 1 stable manure.
- 1 vegetable ivory.
- 24 "special manures" or "formulas" for particular crops.

 141

Here follow the details of those analyses which have any general interest, together with such remarks as may be useful in explanation.

SUPERPHOSPHATES, GUANOS, &c.

Of thirty-eight samples of this class of fertilizers sixteen were analyzed for private parties.

The twenty-one fertilizers whose analyses follow, whatever may be their trade names, are all superphosphates in the commonly received sense of that word, i. e., they contain soluble or reverted phosphoric acid, as a distinctive ingredient. With one exception, **436**, they contain nitrogen, and in fifteen of them potash is present in a greater or less amount. Their nitrogen is in all cases mostly the nitrogen of fish, blood or other animal matters—so-called organic nitrogen. Their soluble and reverted phosphoric acids are mostly the result of acting on some native phosphate, or on bone with sulphuric acid. Their potash is in all cases due to admixture of some grade of potash salts. While, with the exception of **436**, they are of two kinds in respect to the number and nature of their active ingredients, they are practically of one and the same kind as far as the state and mode of action of these ingredients are concerned, and are alike in being compounded and manufactured of similar raw materials, as well as in the cir-

cumstance that they are offered and used for the purpose of applying to crops and soils in general. For these reasons they are classed and tabulated together, so that the consumer may be able easily to make comparisons as to their composition, cost, and estimated value. To facilitate the comparison of cost and valuation, they are arranged in the order in which value exceeds cost or the reverse. In regard to the last two columns of the Table p. 25, it must be remembered that the cost per ton depends somewhat upon the place where they are purchased; the difference, for example, between New York and New Haven prices for articles manufactured or imported at the former place being \$1.50 more or less per ton. Prices also usually vary for the same article, according to the quantity sold. Thus one and the same superphosphate was sold at New Haven for \$38 per ton and at Bristol at \$2.00 per hundred pounds, equal to \$40 per ton. On comparing the composition, valuation and cost of the same articles as obtained from different sources at different times, as, for example, **374** with **410**, **378** with **386**, **399** with **412**, **380** with **456**, **430** with **424** and **460**, it is seen that the extreme fluctuation of cost in any of these cases is \$2.00 per ton, while the valuation varies from about \$0.50 to \$3.50 per ton. The differences in the percent of valuable fertilizing ingredients in the same brand are in some instances not inconsiderable, as will be seen by glancing through the columns of the Table on page 26, where in one case, soluble phosphoric acid varies from 2.4 to 4.9 per cent, and in another, potash ranges from 1.9 to 4.6 per cent. In general, however, the samples are fairly accordant in composition, as nearly so, doubtless, as it is possible to make them, for the manufacturer can only get a uniform product when he is able to obtain raw materials of uniform quality.

The differences to which attention has been drawn are, in fact, necessarily more or less incidental to the business of compounding fertilizers out of various raw or waste matters which are themselves variable in their composition.

In round numbers, the average cost of these fertilizers, \$39, exceeds the average valuation, \$36, by \$3. In them, therefore, the average cost of nitrogen, etc., is somewhat greater than the trade-values that have been employed by the Station for these fertilizing elements.

The sample **436**, an imported high-grade superphosphate, without nitrogen, supplies, per ton, 312 pounds of soluble phosphoric acid for \$31.55, or at the rate of ten cents per pound.

SUPERPHOSPHATES, GUANOS, &C.

Station No.	Name or Brand.	Manufacturer.	Dealer.	Sent by
436	Superphosphate of Lime, C. B. 15%	Imported.	H. J. Baker & Bros., New York.	J. J. Webb, Hamden.
404	Superphosphate.	Lombard & Matthewson, Warrenville.	Lombard & Matthewson.	J. D. Gaylord, Ashford.
374	"	Quinnipiac Fertilizer Co., New London.	R. B. Bradley & Co., New Haven.	R. B. Bradley.
378	Mapes Complete Manure.	Mapes Formula & Peruvian Guano Co., Newark, N. J.	A. N. Clark, Milford, Ct.	J. W. Nettleton, Milford.
459	Bridgeport Ground Bone (dissolved.)	Manhattan Fertilizer Co., New York and Bridgeport.	F. C. Stickney, Bridgeport, Ct.	F. C. Stickney.
399	Pine Island Guano.	Quinnipiac Fertilizer Co.	R. B. Bradley & Co.	R. B. Bradley.
455	Superphosphate.	E. Frank Coe, New York.	Buck & Durkee, Williamantic.	Buck & Durkee.
373	Fish and Potash.	Quinnipiac Fertilizer Co.	R. B. Bradley & Co.	R. B. Bradley.
411	"	"	S. A. Weldon & Son, Bristol.	S. R. Gridley, Bristol.
386	Mapes Complete Manure.	Mapes Formula & Peruvian Guano Co., Newark, N. J.	Mapes Formula Co., Hartford.	L. S. Wells, New Britain.
384	Ammoniated Bone Superphosphate.	Geo. W. Miles Co., Milford.	Geo. W. Miles Co.	J. W. Nettleton, Milford.
412	Pine Island Guano.	Quinnipiac Fertilizer Co.	S. A. Weldon & Son.	S. R. Gridley, Bristol.
410	Superphosphate.	"	S. A. Weldon & Son.	S. R. Gridley, Bristol.
381	"	"	A. N. Clark, Milford.	J. W. Nettleton, Milford.
437	Soluble Pacific Guano.	Lister Bros., Newark, N. J.	J. M. Belden, New Britain.	G. M. Barbour, New Britain.
380	Superphosphate.	Pacific Guano Co., Boston, Mass.	E. B. Clark, Milford.	J. W. Nettleton, Milford.
415	"	Russell Coe, Linden, N. J.	Wilcox & Judd, Bristol.	S. R. Gridley, Bristol.
456	"	Bradley, Boston, Mass.	Buck & Durkee, Williamantic.	Buck & Durkee.
430	Manhattan Blood Guano.	Russell Coe, Linden, N. J.	R. J. Homes, Plainville.	J. W. Hemingway, Plainville.
424	"	"	G. H. Staples, Westport.	S. B. Wakeman, Saugatuck.
460	"	"	F. C. Stickney, Bridgeport.	F. C. Stickney.

Station No.	Name.	Nitrogen.	Soluble Phos. Acid.	Reverted Phos. Acid.	Insoluble Phos. Acid.	Potash.	Estimated value per ton	Cost per ton.	Valuation exceeds cost.
436	C. B. 15 per cent. Superphos.,		15.60	.24	.17		\$39.67	\$31.55*	\$8.12
401	Lombard & M. Superphosph.	3.61	5.10	8.15	2.97		44.83	40.00	4.83
374	Quinn Fert. Co. Superphos.,	3.31	1.23	7.60	5.57	2.77	40.28	38.00	2.28
378	Mapes Complete Manure, --	3.13	4.86	5.04	2.48	3.30	40.64	40.00	0.64
459	Bridgeport Dis. Bone, -----	.89	5.18	3.41	5.24		29.99	30.00	Cost exceeds valuation.
399	Pine Island Guano, -----	5.70	.86	4.03	2.42	4.37	39.52	40.00	.48
455	E. Frank Coe's Superphos.,	2.61	9.14	.55	2.06		37.15	38.00	.85
373	Fish and Potash, -----	4.25	1.44	3.07	.87	4.65	32.93	34.00	1.07
411	Fish and Potash, -----	4.52	1.27	3.78	1.88	1.92	32.42	34.00	1.58
386	Mapes Complete Manure, --	2.44	2.37	7.34	4.50	3.15	38.32	40.00	1.68
384	G. W. Miles Co. Superphos.,	1.90	6.05	1.65	6.25	1.76	36.03	38.00	1.97
412	Pine Island Guano, -----	4.79	.92	5.57	2.47	4.60	39.09	42.00	2.91
410	Quinn. Fert. Co. Superphos.,	3.22	1.26	6.88	4.68	2.05	36.81	*40.00	3.19
381	Lister Bros. Superphosphate,	2.22	6.84	1.75	2.44		32.55	36.00	3.45
437	Soluble Pacific Guano, -----	3.28	6.93	1.14	2.72	3.98	40.09	46.00	5.91
380	Russell Coe's Superphosph.,	1.13	4.06	2.02	7.30	1.35	29.75	36.00	6.25
415	Bradley's Superphosphate, -	3.06	7.48	.87	1.25	1.46	35.57	**43.00	7.43
456	Russell Coe's Superphosph.,	.84	2.93	2.45	9.60		28.53	38.00	9.47
430	Manhattan Blood Guano, --	2.37	5.57	1.52	6.08	.76	35.33	45.00	9.67
424	Manhattan Blood Guano, --	2.56	5.99	1.10	4.19	.56	33.55	46.00	12.45
460	Manhattan Blood Guano, --	2.47	6.09	.75	2.99	1.29	31.80	45.00	13.20

* \$2.00 per hundred pounds.

** \$2.15 per hundred.

Average of 21 samples, -----

\$35.95

\$39.07

\$3.12

COMPARISON OF DIFFERENT SAMPLES OF THE SAME BRAND OF
SUPERPHOSPHATE, &c.

		Nitro- gen.	Soluble Phos. Acid.	Revert. Phos. Acid.	Insol. Phos. Acid.	Potash.	Estim. Value.	Cost.
Quinnipiac Fertilizer	{ 374	3.31	1.23	7.60	5.57	2.77	\$40.28	\$38.00
Co's Superphosphate,	{ 410	3.22	1.26	6.88	4.68	2.05	36.81	(40.00)
Mapes Complete Ma- nure,	{ 378 386	3.13 2.44	4.86 2.37	5.04 7.34	2.48 4.50	3.30 3.15	40.64 38.32	40.00 40.00
Pine Island Guano,	{ 399 412	5.70 4.79	.86 .92	4.03 5.57	2.42 2.47	4.37 4.60	39.52 39.09	40.00 42.00
R. Coe's Superphos- phate,	{ 380 456	1.13 .84	4.06 2.93	2.02 2.45	7.30 9.60	1.35	29.75 28.53	36.00 38.00
Manhattan Blood Gu- ano,	{ 430 424 460	2.37 2.56 2.47	5.57 5.99 6.09	1.52 1.10 .75	6.08 4.19 2.99	.76 .56 1.29	35.33 33.55 31.80	45.00 46.00 45.00
Fish and Potash,	{ 373 411	4.25 4.52	1.44 1.27	3.07 3.78	.87 1.88	4.65 1.92	32.93 32.42	34.00 34.00

POLLARD'S PRIVY GUANO.

The readers of the first Bulletins of this Station will remember that in August, 1877, analyses were published of two so-called "Improved Fertilizers," purporting to be made by Pollard Bros., then of New Haven.

These fertilizers, a "Composition for Grass" and a "Composition for Vegetables," were sold to some extent in the vicinity of New Haven for \$32 per ton. They consisted essentially of dried harbor mud, with a little bone dust added, and were commercially worth about \$1 per ton.

In January, 1880, the newspapers announced the discovery by H. M. Pollard, of Providence R. I., of a new and valuable fertilizer made from night soil, and soon after a sample of "Concentrated Privy Guano" was brought to the Station by a party who gave his name and address as F. C. Cook, 119 Ellsworth Avenue, New Haven, and who represented the sample to have been sent him by the manufacturers, Pollard & Cook, of Providence. In February the same person brought another sample, which he stated was taken by himself in New Haven from a lot of ten tons which he had purchased for his own use.

These samples were duly analyzed—the first completely, the second partially, and the reports of the analyses were made out in the usual form, signed by me, and mailed to F. C. Cook. On April 3, the analyses were published in Bulletin 38, as follows:

347, 354, Concentrated Privy Guano, manufactured by Pol-lard & Cook, Providence.

No. **347** sampled by the manufacturers and brought to the Station January 16, by F. C. Cook, 119 Ellsworth Avenue, New Haven.

No. **354** sampled by F. C. Cook, in February, from lot of ten tons purchased by him. Cost, \$65 per ton.

COMPOSITION.

	347	354
Moisture	5.10	
Organic Matter, (Nitrogen—0.50).....	7.93	
Ammonia..... (" 4.06).....	4.92	
Nitric Acid... (" 10.03).....	38.70	
Phosphoric Acid, soluble.....	7.76	
Sulphuric Acid.....	4.71	
Chlorine.....	.22	
Soda.....	2.06	
Potash	24.90	
Lime	3.70	
Magnesia.....	trace	
	100.00	
Total Nitrogen.....	14.59	14.29

VALUATION OF 347.

	lbs. per ton.	Val. per lb.	Ton Value.
Nitrogen of Nitrates.....	200.6	26 cts.	\$ 52.15
Nitrogen of Ammonia.....	81.2	22½ "	18.27
Organic Nitrogen.....	10.0	20 "	2.00
Soluble Phosphoric Acid.....	155.2	12½ "	19.40
Potash.....	498.0	7½ "	37.35
Total Estimated Value.....			\$129.17
Cost			65.00

The analyses were accompanied with the following remarks:

This Privy Guano has an unmistakable privy odor, but unlike night soil, it is almost entirely soluble in water, and unlike both night soil and urine, it consists mainly of nitrates and phosphates of potash, ammonia and soda. It is not manufactured from night soil, although it is flavored with this last-named substance. Its commercial value is almost double its cost, a fact that would be very welcome to the consumers of fertilizers if it could remain a

fact. But a "Privy Guano" of this composition cannot long be afforded for much less than \$130 per ton, and the extraordinary value of the two samples that thus early have found their way to the Station, should put purchasers on their guard against a sudden and great decline in its composition and value.

Any parties who have laid in a supply would do well to have samples analyzed before waiting for a crop.

In Bulletin 44, issued June 12, 1880, was reported :

The last advices about the Pollard Fertilizers come from Philadelphia, where, according to the letters of an inquiring correspondent, one Dr. H. M. Pollard, representing himself to have been at one time State Chemist to Rhode Island, and afterwards to Massachusetts, has been disposing of the right to make a patent fertilizer, the composition of which is attested by an analysis over the signature of the Director of this Station, giving its value at \$127.59 per ton. My correspondent writes that he obtained this information from a party who had agreed to buy the patent right for a certain section of Pennsylvania, for a considerable sum of money, to whom Pollard represented that the fertilizer could be made for \$13.56 per ton, and that the right to manufacture it had been sold for Easton, Pa., for \$500, and had been negotiated for Allentown and Reading, Pa., and for Baltimore, Md.

It would thus appear that H. M. Pollard "discovered" the Concentrated Privy Guano, and obtained its analysis from this Station for the purposes of a swindling expedition on which he is now engaged.

Finally, in September, inquiry was made at the Station as to the cost of analyzing a sample of guano, or supposed guano, which it was stated had been supplied by H. M. Pollard to parties who had bought the "right" to manufacture for this State. It was further stated that the swindle had been discovered, and that H. M. Pollard had been under arrest for some reason therewith connected.

BONE MANURES.

Method of Valuation.

The method adopted for the valuation of bone manures has been already outlined on page 20. I give here further details.

Experience has led me to distinguish, for the purposes of valuation, five grades of ground bone, the proportions of which are found by a mechanical analysis, *i. e.* by passing a weighed sample

of the bone through a system of four sieves. These five grades have the dimensions, and have had, hitherto, the trade-values below specified, viz :

Grade.	Dimensions.	1879 & 1880. Estimated value per pound.	
		Nitrogen.	Phos. Acid.
Fine,	smaller than one $\frac{1}{80}$ inch,	18 cts.	7 cts.
Fine medium,	between $\frac{1}{80}$ and $\frac{1}{40}$ inch,	17 $\frac{1}{4}$ "	6 $\frac{1}{2}$ "
Medium,	" $\frac{1}{40}$ and $\frac{1}{20}$ inch.	16 $\frac{1}{2}$ "	6 "
Coarse medium,	" $\frac{1}{20}$ and $\frac{1}{10}$ inch,	15 $\frac{3}{4}$ "	5 $\frac{1}{2}$ "
Coarse,	larger than $\frac{1}{10}$ inch,	15 "	5 "

The chemical and mechanical analysis of a sample of ground bone being before us, we separately compute the nitrogen value of each grade of bone which the sample contains, by multiplying the pounds of nitrogen per ton in the sample by the per cent. of each grade, taking $\frac{1}{100}$ th of that product, multiplying it by the estimated value per pound of nitrogen in that grade, and taking this final product as the result in cents. Summing up the separate values of each grade, thus obtained, together with the values of each grade for phosphoric acid, similarly computed, the total is the estimated value of the sample of bone.

As an example of the valuation of a bone manure by this method, the following may serve. 92,* raw bone, from Stepney Bone Mills, Monroe, contained phosphoric acid 20.56 *per cent.* or 411.2 pounds per ton, and nitrogen 3.63 *per cent.* or 72.6 pounds per ton. By the mechanical analysis it showed :

26	per cent.	fine.
23	"	fine medium.
27	"	medium.
24	"	coarse-medium.
0	"	coarse.

The calculations are as follows :

$$\begin{aligned}
 72.6 \times 26 \div 100 \times 18 &= \$3.40 \\
 72.6 \times 23 \div 100 \times 17\frac{1}{4} &= 2.88 \\
 72.6 \times 27 \div 100 \times 16\frac{1}{2} &= 3.23 \\
 72.6 \times 24 \div 100 \times 15\frac{3}{4} &= 2.84 \text{———}
 \end{aligned}$$

Estimated value of nitrogen = \$12.25

$$\begin{aligned}
 411.2 \times 26 \div 100 \times 7 &= \$7.48 \\
 411.2 \times 23 \div 100 \times 6\frac{1}{2} &= 6.15 \\
 411.2 \times 27 \div 100 \times 6 &= 6.66 \\
 411.2 \times 24 \div 100 \times 5\frac{1}{2} &= 5.43 \text{———}
 \end{aligned}$$

Estimated value of phosphoric acid = \$25.72

Total estimated value = \$37.97

* Reported in 1878.

This result agreed within \$2.00 of the cost (\$40.00).

When the sample of bone contains foreign matters introduced as preservatives, dryers or adulterants, such as salt, salt-cake, niter-cake, ground oyster-shells, spent lime, plaster, or soil, these must be taken account of in the mechanical analysis, especially since they would be likely on sifting to pass chiefly or entirely into the finer grades. Lister's Bone usually contains a considerable, sometimes a large percentage of salt-cake; of sample 101*, 54 per cent. passed the finest sieve, but the sample yielded to water 14 per cent. of salt-cake, which mostly passed the finest sieve. In such cases, the several grades as obtained by sifting, must be separately examined and the amounts of foreign matter which they contain must be suitably taken into the account.

In some instances a further source of error in valuation may arise from the fact that the proportions of nitrogen and phosphoric acid are not the same in the finer and coarser portions of a sample, which contains no adulterants, properly speaking, but partly consists of meat, tendon, etc., as is especially the case in certain kinds of "tankings."

There is, however, a limit beyond which it is useless to attempt to refine the processes of valuation. When they become too complicated or costly they defeat the object which they should serve. It is sufficient when the errors of valuation are no greater than those which arise from unavoidable variations in different portions of the same lot of fertilizer, or in different lots of the same brand. A difference of two or three dollars between cost and estimated value cannot ordinarily demonstrate that either is out of the way.

Analyses of Bone Manures.

(See Tables on pp. 32 and 33.)

Fifteen samples of this class have been analyzed, of which fourteen are here reported. As in former years, the valuation of bone manures in most cases exceeds the cost, when the figures adopted in previous reports for the values of nitrogen and phosphoric acid are applied.

Of the fourteen samples, four are to be disregarded in a discussion of cost and valuation. 440, ivory dust, is exceptional on account of its extreme fineness, dryness and freedom from the sand and dirt which adhere to ordinary bone. It is also exceptional in respect to the small quantity to be had and because its texture is

* Reported in 1878.

so dense that it probably acts more slowly than ordinary bone of the same fineness. In it, at \$30 per ton, the cost of nitrogen per pound is but ten cents and that of phosphoric acid but four cents, while in making the valuation in the table, nitrogen is reckoned at eighteen cents and phosphoric acid at seven cents.

427 is a clean quality of bone, sold as cattle food and included here for sake of comparison with **383** and **388**, which are equally fine and rich in phosphates, though not so clean, and with **441**, which agrees almost perfectly with it in composition, is equally clean and pure, but slightly inferior in fineness, and scarcely to be distinguished from it in appearance, while the cost is much less.

Again, **382** is exceptional in composition, as it contains but half the phosphoric acid of the best bone, being mixed with a considerable quantity of salt-cake (sulphate of soda). Excluding, therefore, **440**, **427**, **382** and **443** which is not in market, the average cost of the remaining ten samples is \$33.00 and the average valuation is \$41.74 per ton. Readers of my report for 1879, will remember that the average cost of eight samples of bone manures there noticed was \$32.75 and the average valuation \$40.50. In that Report I showed that the cost of bone manures in 1879 would have justified reducing the estimated values of nitrogen and phosphoric acid in this class of fertilizers twenty per cent. below the values employed then and now for superphosphates. It is seen that the analyses of 1880 confirm this result, so that the following comparison between the Station valuation and the cost of the active fertilizing elements of bone manures, holds this year as it did last.

Grade.	Dimensions.	Hitherto estimated value per pound.		Cost per pound in 1879 and 1880.	
		Nitrogen.	Phos. acid	Nitrogen.	Phos. acid
Fine,	Smaller than $\frac{1}{50}$ inch,	18 cts.	7 cts.	15 cts	6 cts.
Fine-medium,	Between $\frac{1}{50}$ and $\frac{1}{25}$ inch,	17½ "	6½ "	14 "	5½ "
Medium,	" $\frac{1}{25}$ and $\frac{1}{10}$ inch,	16½ "	6 "	13 "	5 "
Coarse-medium,	" $\frac{1}{10}$ and $\frac{1}{5}$ inch,	15½ "	5½ "	12 "	4½ "
Coarse,	Larger than $\frac{1}{5}$ inch,	15 "	5 "	11 "	4 "

It is therefore proper to abandon the estimated values* hitherto adopted for the ingredients of bone and to substitute for them the real trade-values or cost per pound of those ingredients as established by the analyses of 1879 and 1880. This substitution will in fact be carried out in 1881. See p. 21.

* In my first Report I was obliged to adopt the values then currently employed, some of which were sufficiently exact, but others were less so, because of the insufficiency of the data at hand at that time for establishing them.

BONE MANURES.

Station No.	Name or Brand.	Manufacturer.	Dealer.	Sent by
440	Ivory Saw Dust.	F. S. Johnson, Plainville.	Manufacturers.	J. W. Hemingway, Plainville.
441	Bone Saw Dust.	Holyoke Mfg. Co., Holyoke, Mass.	R. T. Prentiss, Holyoke, Mass.	" "
422	Strictly Pure Ground Bone.	H. J. Baker & Bro., N. Y.	S. B. Wakeman, Saugatuck.	Dealer.
395	" " "	" " "	Manufacturers.	J. H. Jennings, Green's Farms.
333	Peter Cooper's Ground Bone.	Peter Cooper, N. Y.	E. B. Clark, Milford.	J. W. Nettleton, Milford.
406	Bone.	Edmund Smith, South Canterbury.	Manufacturers.	B. Corbin, Fair Haven.
405	Bone.	Lombard & Matthewson, Warrenv'e.	"	J. D. Gaylord, Ashford.
434	Strictly Pure Ground Bone.	H. J. Baker & Bro., N. Y.	"	J. J. Webb, Hamden.
502	Ground Bone.	Peck Bros., Northfield.	"	S. R. Gridley, Bristol.
388	Bone Meal.	Mapes Form. & Peruvian Guano Co.	"	L. S. Wells, New Britain.
442	Ground Bone.	Atwood Bros., Watertown.	"	M. S. Baldwin, Naugatuck.
382	Ground Bone.	Lister Bros., Newark, New Jersey.	A. N. Clark, Milford.	Dealer.
427	Bowker's Bone Meal for Cattle.	Bowker Fertilizer Co., N. Y. (?)	Hubbell & Wakeman, Saugatuck.	W. H. Crouch, Saugatuck.
443	Ground Bone, screened from 442.	Atwood Bros., Watertown.	Manufacturers.	M. S. Baldwin, Naugatuck.

BONE MANURES.—*Analyses and Valuation.*

Station No.	Name or Brand, &c.	Nitro-gen.	Phos. Acid.	Finer than				Coarser than $\frac{1}{8}$ inch.	Station Valuation.	Cost.	Valuation exceeds cost.	Worth reckoned from average cost of 10 samples.¶
				$\frac{1}{10}$ inch.	$\frac{1}{20}$ inch.	$\frac{1}{32}$ inch.	$\frac{1}{64}$ inch.					
440	Ivory Saw Dust; Johnson's.	5.42	24.38	94	6				\$53.64	\$30.00	\$23.64	\$45.30
441	Bone Saw Dust; Holyoke.	3.64	26.16	87	11	2			49.24	35.50	13.74	41.82
422	Strictly pure ground Bone; Baker's.	4.39	22.17	44	26	30			45.21	32.00	13.21	37.11
395	" " "	4.08	22.72	35	30	35			43.62	32.00*	11.62	36.42
383	Peter Cooper's Ground Bone.	1.12	27.38	100					42.36	32.00	10.36	36.22
406	Bone, E. Smith.	4.08	20.99	24	23	21	21	11	39.39	30.00	9.39	32.41
405	" Lombard & Matthewson.	4.05	21.06	18	21	40	21		40.15	32.00	8.15	32.64
434	Strictly pure ground Bone; Baker's.	3.94	19.56	40	29	28	3	1	39.13	31.50	7.63	33.01
502	Ground Bone; Peck Bro's.	4.06	21.79	4	15	30	38	13	38.40	33.00	5.40	31.07
388	Bone Meal; Mapes'.	3.00	25.12	100					45.97	42.00	3.97	39.14
442	Ground Bone; Atwood Bro's.	3.76	20.02	2	11	20	23	44	33.96	30.00	3.96	29.85
	Average of 10 samples.¶								41.74	33.00	8.74 Cost exceeds Valuation.	34.97
382	Ground Bone; Lister Bro's.	3.61	13.04	36	20	18	16	10	28.63	30.00	1.37	20.56
427	Bowker's Bone Meal for Cattle.	3.69	26.29	100					50.09	60.00(?)†	9.91†	31.55
443	Ground Bone (screened from 442).	4.29	21.95	27	26	23	14	10	40.80†			34.51

* In N. Y., \$30.00. † From selected bone ground for Cattle food, sold at \$3.00 per hundred. ‡ Not in market. || Exclusive of 440, 382, 427 and 443.

The figures in the last column of the foregoing table are estimated values, reckoned with aid of these revised trade-values, and their fair general agreement with the cost figures, is evidence of their correctness.

The analysis of sample **443** which was screened from bone of the quality of **442**, would seem to show that the softer parts of bone are richer, both in nitrogen and phosphoric acid. This may have been the result of the more perfect drying of the finer part, but the difference of \$7.00 in valuation is chiefly due to the difference in the results of the mechanical and not of the chemical analysis.

DRIED BLOOD AND TANKAGE.

Of 17 samples analyzed, 13 were examined for private parties. The other 4 gave results as follows:—

No.	Made by	Sampled by
391 Dried Blood, &c.	Sperry & Barnes, New Haven.	R. E. Pinney, Suffield.
392 " " "	Strong, Barnes, Hart & Co.	" " "
439 " " "	" " " "	J. J. Webb, Hamden.
468 " " "	S. E. Merwin & Co., N. Haven.	J. D. Sage & Sons, Long Hill.

ANALYSES.

	391	392	439	468
Nitrogen, -----	6.20	8.80	8.25	7.38
Phosphoric acid, -----	6.02	3.55	6.41	8.27
Estimated value per ton,* -----	\$33.23	\$36.65	\$41.97	\$40.27
Cost per ton, -----	26.00	?	30.00	35.00
Valuation exceeds cost, -----	7.23	?	11.97	5.27
Worth reckoned from average cost,**	27.06		34.09	33.54

* Nitrogen reckoned at 20 cts. and phosphoric acid at 7 cts.

** " " " " 16 cts. " " " " 6 cts.

Here the average valuation is \$38.47, and the average cost \$30.31. The difference, \$8.16, is twenty-one per cent. of the valuation. Thus it is seen that the trade values of nitrogen and of phosphoric acid in dried blood hitherto used, viz.: twenty cents and seven cents, admit of the same reduction as in bone manures. The phosphoric acid of dried blood and tankage comes mostly from bone, and should therefore, when finely pulverized, properly rank with that of fine bone at six cents per lb. The nitrogen is somewhat more active than that of simple bone, owing to greater subdivision of the substance, and may therefore be reckoned at sixteen cents. The last figures in the table above, are the values

thus calculated from the average cost of the samples, and they show that six cents and sixteen cents are high enough valuations for the phosphoric acid and nitrogen, respectively, of this class of goods.

The other analyses of dried blood and so-called azotin, made in 1880, are given below to show the proportions of moisture and nitrogen in these materials as employed by manufacturers in compounding fertilizers. Phosphoric acid was not determined.

DRIED BLOOD AND AZOTIN.

Station No.		Water.	Nitrogen.	Ammonia equiv. to Nitrogen.
343	Dried Blood,	29.88	9.17	11.13
349	“ “	24.78	10.10	12.26
350	“ “	10.11	10.73	13.03
355	“ “	24.78	9.85	11.96
361	“ “	20.42	10.53	12.79
368	“ “	19.02	9.32	11.32
444	“ “	15.10	7.33	8.90
344	Azotin,	8.32	11.95	14.51
353	“	6.65	11.96	14.52
360	“	10.21	10.08	12.24
367	“	8.84	11.90	14.45
369	“	11.27	10.07	12.24
371	“	10.78	10.40	12.39

FISH SCRAP OR FISH GUANO.

Of the sixteen samples examined, but two have been sent in by consumers, viz., **372** and **433**, both made by the Quinipiac Fertilizer Company of New London. The former was sampled by R. B. Bradley, from stock of R. B. Bradley & Co., New Haven. Cost, \$40; valuation,* \$44.31. The latter was sampled by E. F. Blake from stock of J. M. Belden, New Britain. Cost, \$38; valuation,* \$42.75.

The cost of nitrogen and phosphoric acid in these samples is about eighteen cents and six cents, respectively.

The analyses of all the samples (phosphoric acid not determined except in two cases) are given below, with the average composition as found in former years.

* Nitrogen reckoned at twenty cents and phosphoric acid at seven cents.

ANALYSES OF FISH SCRAP.

Station No.	Designation.	Water.	Nitrogen.	Ammonia equiv. to Nitrogen.	Nitrogen in water-free fish.	Phos. Acid.
372	Dry Fish Guano,-----	10.16	8.54	10.37	9.50	7.25
408	Fish,-----	20.85	7.63	9.27	9.51	
429	Dry Fish Guano,-----	16.26	8.04	9.76	9.60	7.28
433	Dry Ground Fish,-----		8.14	9.88		
445	Dry Fish Guano,-----	19.24	8.02	9.74	9.93	
461	Fish Guano,-----	17.39	8.26	10.03	9.99	
463	" Scrap,-----	16.55	8.40	10.20	10.06	
466	Dry Fish,-----	18.78	8.35	10.14	10.28	
478	" "-----	15.65	7.84	9.52	9.29	
479	Fish Guano,-----	23.61	7.57	9.19	9.91	
480	" "-----	20.11	7.86	9.54	9.84	
495	" "-----	17.87	8.08	9.80	9.83	
498	" "-----	19.00	7.77	9.43	9.59	
499	" "-----	21.86	7.30	8.87	9.34	
501	" "-----	16.11	8.10	9.84	9.65	
504	" "-----	16.43	7.86	9.54	9.40	
	Average for 1880,-----	17.99	8.11	9.85	9.89	
	" " 1879,-----	19.13	7.70	9.34	9.46	
	" " 1878,-----	14.90	7.65	9.24	7.91	
	" " 1877,-----	13.66	8.24	10.01	9.36	
	" " 1875 and 1876,-----	11.78	7.80	9.47	8.84	

BUFFALO HORN SHAVINGS.

432. Sent by J. W. Hemingway from factory of F. S. Johnson, Plainville.

ANALYSIS.

	432
Nitrogen-----	14.50
Phosphoric Acid-----	.15
Cost per ton-----	\$30.00
Cost of Nitrogen-----	10½ cts. per lb.

The sample is quite identical in composition with that from the same source reported last year, and the cost of nitrogen in it nearly the same as in coarse bone, i. e., eleven cents.

CASTOR POMACE AND COTTON SEED MEAL.

No.	Name.	Manufacturer.	Dealer.	Sent by
390	Castor Pomace,	Collins Co., St. Louis.	F. Ellsworth, Hartford.	L. S. Wells, New Britain.
398	" "	H. J. Baker & Bro., New York.	Manufacturers,	M. S. Baldwin, Naugatuck.
418	" "	Same.	F. Ellsworth, Hartford.	L. S. Wells, New Britain.
394	Cotton Seed Meal,-----		Smith, Northam & Robinson, Hartford.	R. E. Pinney, Suffield.
402	" " "-----		C. H. Carrington, Naugatuck.	M. S. Baldwin, Naugatuck.

ANALYSES AND VALUATIONS.

Station No.	Nitro- gen.	Phos. Acid.	Potash.	Estimated value per ton.	Cost.	Valuation exceeds cost.	Worth reck- oned from average cost.
Castor Pomace,							
390	5.73	1.79	1.29	\$27.30	\$20.00	\$7.30	\$21.52
398	5.06	1.86	1.02	\$24.50	\$19.00*	\$5.50	\$19.24
418	4.64	1.34	.53	\$21.45	\$20.00	\$1.45	\$16.88
Average,	5.14	1.66	.95	\$24.42	\$19.66	\$4.75	\$19.21
Cotton Seed Meal,							
391	7.20	3.33	2.11	\$36.69	\$25.00†	\$11.69	\$28.72
402	6.89	3.49	2.07	\$35.69	\$30.00	\$5.69	\$27.89
Average,	7.04	3.41	2.09	\$36.19	\$27.50	\$8.69	\$28.30

* In New York.

† In 10 ton lots.

The average estimated value exceeds average cost by nearly nineteen and one-half per cent. in case of castor pomace, and by twenty-four per cent. in case of cotton seed meal. The trade values used for reckoning the above valuations were twenty cents for nitrogen, nine cents for phosphoric acid, and four and one-half cents for potash. The same reduction of trade values that we have seen to be justified by the bone manures and by dried blood applies therefore to these fertilizers. Calculating on the basis of nitrogen sixteen cents, phosphoric acid six cents, and potash three and one-half cents we obtain as the average value of castor pomace \$19.20, and of cotton seed meal \$28.30, which agree fairly with the average market prices, and with the single exception of **418** the valuation thus obtained is above the actual cost of the samples.

The composition and actual value of these samples of cotton seed meal is not essentially different from that of the damaged cotton seed analyzed last year. The cost is more by several dollars per ton.

SULPHATE OF AMMONIA.

The four analyses of this fertilizer were made for manufacturers. The results show the quality of the commercial article. The cost was not made known.

	346	362	370	375
Nitrogen.....	20.36	20.03	19.84	19.82
Equivalent to Ammonia.....	24.72	24.31	24.19	24.07
Equivalent to Sulphate of Ammonia.....	95.98	94.42	93.91	93.49

Sulphate of ammonia is cheaply manufactured as a bye product from the illuminating-gas works, and furnishes more nitrogen in a given weight than any other fertilizer employed in agriculture. Its nitrogen being in the state of ammonia, and the salt itself being freely soluble in water, convenient to handle, and permanent under transport, it is eagerly bought by compounders of fertilizers. It is now manufactured in the large towns of Connecticut, so that consumers have the opportunity to bid for the purchase of it at first hand.

NITRATE OF SODA.

482. From stock of Sisson & Butler, Hartford. Sampled and sent by T. N. Bishop, Plainville.

Nitrogen	15.91
Equivalent to Nitrate of Soda	96.30
Moisture	1.61
Undetermined matters	2.09
	<hr/> 100.00
Calculated value per 100 lbs.	\$4.13
Cost	4.50

The cost of nitrogen in this sample is 28 $\frac{1}{4}$ cents per lb.

POTASH SALTS.

Muriates.

No.	Importer.	Dealer.	Sent by
387	Mapes Formula and Peruvian Guano Company, New York.	Importers.	L. S. Wells, New Britain.
438	H. J. Baker & Bro., New York.	Importers.	J. J. Webb, Hamden.
509	?	A. Lathrop.	H. H. Austin, Suffield.

Sulphates.

389	Mapes Formula and Peruvian Guano Company, New York.	Mapes' Ct. Valley Branch, Hartford.	L. S. Wells, New Britain.
397	H. J. Baker & Bro., New York.	Importers.	M. S. Baldwin, Naugatuck.
428	H. J. Baker & Bro., New York.	Importers.	P. M. Augur, Middlefield.
457	C. V. Mapes & Co., New York.	Mapes' Branch, Hartford.	R. E. Pinney, Suffield.
508	?	A. Lathrop, Suffield.	H. H. Austin, Suffield.

POTASH SALTS.—ANALYSES.

	Muriates.			Sulphates.				
	387	438	509	389	397	428	457	508
Potash (potassium oxide),	50.37	52.18	53.83	35.68	49.17	47.37	46.87	27.38
Equivalent to pure muriate,	79.80	82.50	85.25					
“ “ sulphate,				66.00	91.00	87.50	86.70	50.74
Chlorine,				7.56	none	none	0.40	1.20
Potash guaranteed or im- plied in brand,	43.23	44.85		37.83	48.64		44.05	27-29
Cost per ton,	\$40.00	\$40.00	\$32.00	\$65.00	\$72.00*	\$65.00	\$66.66**(?)	\$35.00
Estimated value per ton,†	\$45.33	\$46.96	\$48.45	\$53.52	\$73.76	\$71.06	\$70.31	\$41.07
Cost per 100 lbs. of potash,	\$3.97	\$3.83	\$2.97	\$9.10	\$7.32	\$6.86	\$7.11	\$6.39
Sent in month of	April	May	Nov.	April	April	May	June	Nov.

* In New York.

** “Cost $3\frac{1}{2}$ in Hartford.”† Potash reckoned in muriate at $4\frac{1}{2}$ cts., in sulphate at $7\frac{1}{2}$ cts. per lb.

The fluctuations in the cost of potash are like those noticeable in former years. The samples bought in April and May yield potash as muriate for about four cents, and as sulphate for seven to nine cents; those sent in November furnish potash for three cents and six and one-half cents per lb. It would appear from these data, together with those of last year, that for the purposes of valuation at present three and one-half cents is a fair trade value for potash in muriate and seven cents in sulphate.

WOOD ASHES.

400. Ashes from stock of W. W Cooper, Suffield. Sent by R. E. Pinney, Suffield.

401. Canada Leached Ashes from stock of James A. Bill. Sent by Otis Snow, Rockville.

Sample **400** is apparently unleached ashes, and the analysis closely resembles, in most particulars, one made at this station last year on hickory ashes. The sample has evidently been exposed to wet, and may have lost a portion of alkali. Reckoning in it the potash at seven and one-half cents, lime at one-quarter of a cent (cost at kiln in New Haven), magnesia at two cents, phosphoric acid at seven cents, and sulphuric acid at one-half cent per pound, the estimated value of 100 pounds is \$0.57 $\frac{1}{2}$, while the cost is \$0.83. Allowing lime to be worth at Suffield one-half cent per

pound, to cover transportation, would raise the valuation to \$0.66. On the other hand, considering the potash worth no more than in muriate (four and one-half cents) would reduce the value fourteen cents per hundred pounds. The ashes are thus really worth about fifty to sixty-five cents per 100 pounds, the former price for ordinary crops, the latter for tobacco where muriate of potash is objectionable. The valuation of fertilizers like this sample is less exact than in case of superphosphates, etc., because those ingredients, like lime, which make up a large part of its weight, have very variable commercial values, according to locality and state of market.

	400	401
Potash	4.66	1.26
Soda	1.20	.54
Lime	34.02	24.37
Magnesia	2.41	2.43
Iron Oxide and Alumina	1.41	2.13
Phosphoric Acid	1.19	1.26
Sulphuric Acid .....	.95	.10
Carbonic Acid	19.25	14.99
Silica and Sand	11.11	15.71
Charcoal	6.86	3.11
Moisture expelled at 212°	13.42	32.02
Combined water and loss	3.52	2.08
	<hr/> 100.00	<hr/> 100.00
Carbonate of Lime, equivalent to Lime	60.7	43.6
Weight per bushel	42 lbs.	56 lbs.
The weight per bushel was not stated, but 56 lbs. appears to be the average.		
Cost per bushel	35 cts.	21 cts.
Cost per 100 lbs.	83 cts.	37½ cts.

401 has essentially the composition usually found in leached wood ashes. It contains, indeed, more sand and silica than the average, but also more potash, while lime and phosphoric acid are up to the average.

In previous Reports I have endeavored to ascertain by calculation what mixture of other materials can furnish a substitute for the Leached Ashes that are imported from Canada and so highly valued for their effect on the land and crops. In the hope that my conclusions may be of service to some who have not seen those Reports, and that some of our farmers may take the trouble to make some experiments in this direction and publish the results, I reprint a paragraph from the Report for 1879, which was writ-

ten with reference to three analyses of Leached Ashes made that year.

"These ashes, applied at the rate of a ton (36 bushels) per acre, furnish, besides a large dose of carbonate of lime (1,100 lbs.), serviceable quantities of potash (20 lbs.), of magnesia (60 lbs.), and of phosphoric acid (30 lbs.); but the chief effects of the application come from the carbonate of lime. With the help of the analyses of oyster-shell lime, we can calculate closely the composition and cost of a mixture which would be equal in all respects, or even superior to these leached ashes. The essential fertilizing matters of 100 lbs. of leached ashes would be contained in

Slacked Oyster-Shell Lime.....	54 lbs.	costing*	9 cts.
Muriate of Potash.....	2 "	"	5 "
Ground Bone.....	8 "	"	12 "
Total.....			26 cts.

* At kiln.

One hundred pounds of leached ashes cost, in 1879, on the average, twenty-five cents. Our mixture, however, would contain, in its bone, about four cents' worth of nitrogen which is absent from leached ashes, so that the value of the materials of this mixture is not less than that of the ashes. The mixture would contain hydrate of lime which would make it in most cases a better application to the soil, but might perhaps do damage to the plant unless carefully distributed."

The less cost of the leached ashes analyzed last year (25 cents per bushel on the average) was owing in part at least to the fact that two of the samples were delivered on tide water (for 12½ and 14 cents per bushel). The third sample cost at Canterbury 16½ cents per bushel.

The comparison as to cost between the above mixture and leached ashes at any given locality may easily be made by applying local prices to the reckoning.

LAND PLASTER.

No.	Manufacturer.	Dealer.	Sent by
414	E. B. Alvord, Jamesville, N. Y.	S. A. Weldon & Son, Bristol.	S. R. Gridley, Bristol.
419	George Abbott, Branchville.	Manufacturer.	D. H. Van Hoosear, East Wilton.
431	?	E. N. Pierce, Plainville.	T. N. Bishop, Plainville.

Analyses.

	Pure Gypsum.	414	431	419
Sand and insoluble matters.....	—	7.48	7.81	3.83
Carbonate of Lime etc. (by diff.).	—	17.08	17.03	2.34
Sulphuric Acid.....	46.51	35.09	34.96	43.64
Lime	32.56	24.56	24.47	30.56
Combined water.....	20.93	15.97	15.73	19.63
Hydrated Sulphate of Lime:	100.00	75.44	75.16	93.83
	100.00	100.00	100.00	100.00
Cost per ton.....		\$7.50	\$7.00	\$ 6.00
One hundred lbs. of pure Gypsum cost		0.50	0.46½	0.32

at Bristol. at Plainville. at Branchville.

419 is doubtless Nova Scotia plaster, and contains 94 per cent., or about the average amount of gypsum (hydrated sulphate of lime or hydrated calcium sulphate) found in that article. **414** and **431** are the plaster of Jamesville, N. Y., containing 75 per cent. of gypsum and 17 per cent. of carbonate of lime.

PRODUCTS OF SALT MANUFACTURE.

357. Refuse Salt Washings.**358.** Kiln Refuse.**359.** No. 2 Fine Salt.

The above were sampled by the Secretary of the Onondaga Salt Association at Syracuse, N. Y., and were sent to the Station, March 1, by S. A. Smith, Esq., of Cheshire.

Analyses.

	357	358	359
Chloride of Sodium (salt).....	67.92	97.20	98.30
Chloride of Potassium (muriate of Potash).....		.54	.54
Sulphates and Carbonates of Lime and Magnesia...	29.58	2.09	.97
Moisture	2.50	.17	.19
	100.00	100.00	100.00

Cost, delivered on cars in Cheshire, in lots of ten and twenty tons, \$4.67 and \$3.67 per ton, and \$1.32 per barrel, respectively.

The samples having been sent in paper boxes contained less moisture when received than when put up. The following analyses, published by the Salt Association, show what proportions of of moisture are contained in the fresh article. These figures are probably an average, the refuse being naturally somewhat variable in composition.

	Refuse Salt Washings.	Kiln Refuse.
Chloride of Sodium.....	50	70
Sulphate of Lime.....	18	15
Carbonate of Lime and Magnesia.....	8	5
Insoluble Matter.....	4	2
Moisture.....	17	6
Organic Matter.....	3	2
	<hr/> 100	<hr/> 100

Mr. Smith was desirous of knowing how much potash the sample contained. The amount is too small to be worth considering. The commercial value of these articles is evidently the price put upon them by the manufacturers, there being no competition in this class of goods in our market. The fertilizing value for any given soil or crop is only to be determined by actual trial. On some soils, salt (like gypsum on many soils) produces a good effect, not commonly by directly nourishing crops, for agricultural plants require no soda and very little chlorine, but by its solvent action whereby it disengages plant food from the minerals of the soil, or in some other indirect manner.

STABLE MANURE.

385. New York Stable Manure, sold by H. A. Peck & Co., First Avenue, cor. 38th Street, New York, sampled and sent March 30, by John H. Jennings, Green's Farms, from a cargo purchased by him.

	385	Horse Manure, New York, 1874.	Wolff's average, moderately rotted Stable Manure.
Moisture	69.295	75.76	75.00
Organic Matter*.....	19.772	19.17	19.20
Potash .....	.633	.51	.63
Soda .....	.145	.09	.19
Lime .....	.742	.30	.70
Magnesia.....	.288	.19	.18
Oxide of Iron and Alumina....	.554	.19	—
Phosphoric Acid .....	.670	.41	.26
Chlorine .....	.110	.07	.19
Sulphuric Acid.....	.156	.09	.16
Sand and Insoluble matter.....	7.426	3.20	1.68
Carbonic Acid.....	.209	—	—
Undetermined matters.....	—	—	1.81
	<hr/> 100.000	<hr/> 100.00	<hr/> 100.00
* With Nitrogen as Ammonia ..	.118	.26	?
“ Nitrogen, total.....	.693	.53	.50

385 Has nearly the same composition as the sample of New York Stable Manure analyzed in 1874 for the Board of Agriculture; the results published in the Report of the Board for 1873-4, page 350, and here reproduced for the sake of comparison, and also fairly agrees in most respects with Wolff's average of moderately rotted Stable Manure as found in German farming.

385, however, contains about nine per cent. less of moisture and insoluble substances and the proportions of some of the fertilizing matters are correspondingly greater. The cost of this article was six cents per "bushel" of about forty quarts, or one and one-third cubic feet. Mr. Jennings states that several hundred small cargoes of fifty to seventy-five tons each are bought at Green's Farms each year. The cargoes are unloaded on the shore where wanted.

The cost of the horse manure in 1874 at New Haven by rail was \$4.00 per ton of forty-nine cubic feet, equal to eight cents per cubic foot, or ten and two-third cents per "bushel" of forty quarts.

VEGETABLE IVORY SAWDUST AND TURNINGS.

403 From the manufactory of E. Smith, Union City, sent by M. S. Baldwin, Secretary Naugatuck Farmers' Club.

This article was sent to the Station with the request to report upon its agricultural value as a fertilizer and cattle food. A similar sample, **69**, from Cheshire, was examined in 1878 in respect to its value as a fertilizer.

The analyses are as follows:

	69	403
Moisture		18.78
Organic Matter		80.14
Ash		1.08
		<hr/>
		100.00
Nitrogen in Organic Matters	0.48	0.54

As plant food this vegetable ivory has about the same value as straw or dead leaves. It would probably have the same, or a slightly greater value as an ingredient of compost. It is stated to heat and ferment when wet in bulk. Its value in compost, however, requires further observation, since it does not consist mainly of cellulose or woody tissue, but contains sixty-eight per cent. of a carbohydrate soluble in alkalis. See its further analysis under Feeding Stuffs.

SPECIAL FERTILIZERS.

The use of this class of fertilizers would seem to be on the increase. In 1878, twelve samples, in 1879, twelve samples, and this year twenty-four samples have been sent in for analysis. In the first Table of Analyses, p. 47, these fertilizers are arranged in the order in which their cost exceed valuation and the reverse. It is seen from that Table that in the case of fifteen of the samples the cost exceeds the valuation from \$1.00 to nearly \$25.00, while the valuation of the other nine exceeds the cost from \$0.70 to nearly \$6.00. It will be noticed that nitrates are the exclusive source of nitrogen in one sample, **469**, and furnish a part of the nitrogen in another, **473**. In a single sample, **423**, all the nitrogen is present as ammonia salts. In three samples, **413**, **363**, and **476**, the nitrogen exists entirely in the form of organic matter; in all other cases, the nitrogen is present partly in organic matter and partly as ammonia salts. In seventeen samples the potash exists as muriate, or at least is associated with enough chlorine to form potassium chloride.* In two instances, **425** and **473**, the potash is quite pure sulphate, the samples containing less than one-half per cent. of chlorine. In five samples both sulphate and muriate are present.

In a separate Table, page 48, the composition of these fertilizers as guaranteed, and as found by the Station analyses is given in parallel columns. The results of the analyses are there abbreviated to one place of decimals. In case of phosphoric acid, the guarantee sometimes applies to soluble, sometimes to total, in most cases to "available," which is understood to signify soluble and reverted taken together. In each instance the phosphoric acid in the column "found" corresponds in state or form to that signified in the column "guaranteed." In case of **363** and **476** the guaranteed composition has not been made known to the Station.

Examination of the figures shows that out of the sixty-six comparisons the percentage found falls behind that guaranteed in but five instances, and in but two of these does the deficiency amount to one-half per cent.

The Table on pages 50 and 51 is a comparison of all the analyses of special fertilizers that have been made at the Station, together with a few published by Dr. Goessmann in Massachusetts, and by Prof. Cook, of the New Jersey Experiment Station. In this table

* i. e., 35.5 of chlorine to 47 of potash.

SPECIAL FERTILIZERS.

Station No.	Name or Brand.	Manufacturer.	Dealer.	Sent by
413	Bowker's Kitchen Garden Fertilizer,	Bowker Fertilizer Co.	S. A. Weldon & Son, Bristol.	S. R. Gridley, Bristol.
417	Stockbridge Root Fertilizer,	" "	Hubbell & Wakeman, Saugatuck.	James Nash, Saugatuck.
363	" Onion	" "	Hubbell & Wakeman,	Dealers.
409	" Root	" "	S. A. Weldon & Son.	S. R. Gridley.
476	Matfield Corn	Matfield	C. E. Lord, Chester.	Dealer.
474	Forrester's Grass	H. J. Baker & Bro.	S. B. Wakeman, Saugatuck.	"
471	" Wheat	" "	" "	"
377	Mapes' Grass and Grain Fertilizer,	Mapes F. & P. G. Co.	A. N. Clark, Milford.	J. M. Nettleton, Milford.
470	Forrester's Fruit Tree	H. J. Baker & Bro.	S. B. Wakeman.	Dealer.
376	Mapes' Potato	Mapes F. & P. G. Co.	A. N. Clark, Milford.	J. M. Nettleton, Milford.
435	Stockbridge Tobacco	Bowker Fertilizer Co.	J. M. Belden, New Britain.	G. M. Barbour, New Britain.
379	Mapes' Corn	Mapes F. & P. G. Co.	A. N. Clark, Milford.	J. M. Nettleton, Milford.
500	Forrester's Rye	G. B. Forrester.	S. B. Wakeman.	M. S. Baldwin, Naugatuck.
423	" Cabbage	H. J. Baker & Bro.	" "	Dealer.
475	" Rye	" "	" "	"
407	Stockbridge Corn,	Bowker Fertilizer Co.	S. A. Weldon & Sons.	S. R. Gridley.
469	Forrester's Lawn Dressing,	H. J. Baker & Bro.	S. B. Wakeman.	Dealer.
425	" Turnip Fertilizer,	" "	" "	"
426	" Oat	" "	" "	"
421	" Corn	" "	" "	"
472	" Strawberry	" "	" "	"
473	" Tobacco	" "	" "	"
420	" Potato	" "	" "	"
416	" Onion	" "	" "	"

Station No.	Name.	Nitrogen as Ammonia.	Nitrogen as Nitrates.	Organic Nitrogen.	Total Nitrogen.	Soluble Phos. acid.	Reverted Phos. acid.	Insoluble Phos. acid.	Potash.	Chlorine.	Estimated value per ton.	Cost per ton.	Cost exceeds valuation.
413	Bowker K. Garden.	---	---	2.98	2.98	5.12	0.74	0.35	9.82	8.62	\$35.38	\$60.00*	\$24.62
417	Stockbridge Root.	1.40	---	2.40	3.80	4.67	0.33	0.66	7.97	7.03	36.70	50.00	13.30
363	Stockbridge Onion.	---	---	3.10	3.10	4.83	0.51	0.45	7.94	2.63	37.94	50.00	12.06
409	Stockbridge Root.	1.40	---	2.70	4.10	4.70	1.16	0.68	8.08	7.02	39.16	50.00*	10.84
476	Matfield Corn.	---	---	6.06	6.06	1.16	0.88	1.55	5.26	4.98	35.62	45.00	9.38
471	Forrester Grass.	3.07	---	2.37	5.44	2.12	trace	0.95	7.45	7.38	36.63	45.00†	8.37
471	Forrester Wheal.	3.78	---	0.70	4.48	4.57	0.03	1.53	5.63	4.84	39.08	45.00†	5.92
377	Mapes Grass & Grain.	3.03	---	1.71	4.74	2.30	5.19	1.30	6.61	5.20	45.32	51.00	5.68
470	Forrester Fruit Tree.	3.03	---	0.58	3.61	1.39	2.25	0.73	15.05	11.02	38.05	42.50†	4.45
376	Mapes Potato.	0.96	---	2.96	3.92	3.18	5.45	1.77	7.70	5.12	45.64	49.00	3.36
435	Stockbridge Tobacco.	4.62	---	1.49	6.11	5.72	0.37	0.20	5.62	5.16	47.04	50.00*	2.96
379	Mapes Corn.	1.31	---	2.36	3.67	4.08	6.12	1.66	7.21	6.48	45.38	48.00	2.62
500	Forrester Rye.	5.00	---	0.33	5.33	4.73	0.02	1.17	9.45	8.75	45.83	47.50	1.67
423	Forrester Cabbage.	5.62	---	---	5.62	5.74	0.52	0.56	8.16	7.90	48.69	50.00†	1.31
475	Forrester Rye.	4.53	---	0.82	5.35	4.32	trace	1.21	11.34	10.36	46.37	47.50†	1.13
													Value- tion exceeds cost.
407	Stockbridge Corn.	1.58	---	3.13	4.71	5.16	0.84	0.42	6.75	5.93	\$40.70	\$40.00*	\$0.70
469	Forrester Lawn.	---	4.39	---	4.39	4.93	0.80	1.12	12.56	11.21	49.47	47.50†	1.97
425	Forrester Turnip.	6.90	---	1.43	8.33	2.86	0.32	1.09	9.13	0.36	54.01	52.00†	2.01
426	Forrester Oat.	4.78	---	1.84	6.62	3.40	1.56	0.98	9.18	5.80	49.80	47.50†	2.30
422	Forrester Corn.	4.67	---	0.19	4.86	5.59	0.47	1.01	14.56	13.52	51.10	47.50†	3.60
417	Forrester Strawberry.	2.43	---	0.50	2.93	4.19	4.69	2.75	8.74	2.08	46.19	42.50†	3.69
473	Forrester Tobacco.	2.05	2.31	1.11	5.47	3.87	trace	0.98	9.69	0.50	51.27	47.50†	3.77
420	Forrester Potato.	4.36	---	0.40	4.76	0.81	4.63	2.09	11.33	3.82	51.50	47.50†	4.00
416	Forrester Onion.	5.34	---	2.06	7.40	2.56	2.07	1.00	7.25	2.21	51.68	49.00	5.68

* The cost per ton is calculated from the price per bag of 100 or 200 pounds. No prices per ton are given in the circulars of the manufacturers.

† In New York. Local price \$1.50 higher.

SPECIAL FERTILIZERS.

Station No.	Nitrogen		Phosphoric Acid.		Potash.	
	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed	Found.
<i>Bowker—</i>						
413	2.9—3.7	3.0	5—6*	5.1	6—7	9.8
<i>Stockbridge—</i>						
363						
407	4.1—4.9	4.7	5—6*	5.2	5.5—6.5	6.8
409	3.3—4.1	4.1	6—7	5.9	7—8.5	8.1
417	3.3—4.1	3.8	6—7	5.2	7—8.5	8.0
435	5—6	6.1	4—5*	5.7	5—6	5.6
<i>Matfield—</i>						
476		6.1		2.0		5.3
<i>Mapes—</i>						
376	3.7—4.1	3.9	8—10†	10.4	6—8	7.7
377	4.1—5.8	4.7	9—8†	8.8	5—7	6.6
379	3.7—4.1	3.7	10—12†	11.9	6—7	7.2
<i>Forrester—</i>						
416	5.8	7.4	3.5	4.6	7	7.3
420	3.5	4.8	5.5	5.4	10	11.3
421	5.1	4.8	5.5	6.1	9	14.6
423	4.3	5.6	5	6.3	7	8.2
425	6.8	8.3	3	3.2	8.3	9.1
426	5.4	6.6	4	5.0	8	9.2
469	2.7	4.4	5	5.7	5	12.6
470	1.6	3.6	3	3.6	10	15.1
471	5.1	4.5	4	4.6	4	5.6
472	2.5	2.9	5	8.9	6	8.7
473	4.1	4.4	1	3.9	8.3	9.7
474	4.9	5.4	2	2.1	6	7.5
475	4.9	5.4	4	4.3	8	11.3
500	4.9	5.3	4	4.8	8	9.5

* Soluble.

† Total.

the fertilizers are arranged according to the crops for which they are intended, and by the name with which they are commonly designated. The table serves to show (1) the variations which the same brand has been subject to from year to year, and (2) the often wide variations between different brands made for the same crop. Since the manufacturers give abundant testimonials from practical farmers, showing that each of these fertilizers is well-adapted for its purpose, we can hardly avoid concluding that it makes very little difference to the corn crop, for example, whether a corn fertilizer contains 6.2 or 3.7 per cent. of nitrogen, 11.4 or 2 per cent of available phosphoric acid, 14.6 or 4.6 per cent. of potash !

When we consider that soils differ very widely from each other in native producing power, and may be made to differ as widely by the treatment they receive under what we term "cultivation," there can be no doubt that any one of these special fertilizers may be used as profitably on any other crop as on that after which it is named.

COST OF ACTIVE INGREDIENTS OF FERTILIZERS DURING 1880.

Organic Nitrogen has cost in the manipulated fertilizers, viz: superphosphates and special manures, on the average, more than the amount allowed in the valuations, *i. e.* twenty cents per pound. In dry fish scrap the cost has been eighteen cents. In the samples of low-grade dried blood and tankings analyzed by the Station, nitrogen has cost sixteen cents and in castor pomace and cotton seed meal it has also cost sixteen cents. The nitrogen of fine bone has been bought for fifteen cents. The ruling market price of nitrogen in the highest grades of dried blood, has been during the spring, until mid-summer, about fifteen cents. In the autumn, as usual, the price advanced because of active demand among the manufacturers of superphosphates, etc., and reached eighteen cents per pound.

It is plain that there is a considerable and permanent difference between the trade-value or cost to the farmer, of organic nitrogen in the superphosphates and other manipulated fertilizers and that of the raw materials ordinarily accessible to the retail purchaser. To adapt our system of valuation more perfectly to this state of things, I shall continue to rate organic nitrogen in superphosphates and special manures and in fine steamed bone, finely ground and dry meat, blood and fish, and in Peruvian guano, at twenty cents. In view of the market prices that have ruled for two years, I shall rate together the nitrogen of coarse or moist meat, blood, tankage, castor pomace and cotton seed meal at sixteen cents. The trade-values of nitrogen in the various grades of bone will also be reduced to conform to their actual cost. See statement and Table on page 31.

Nitrogen in the form of Ammonia-Salts and Nitrates.—Ammonia salts do not appear in our retail market except as ingredients of some manipulated fertilizers, and the Station valuation for their nitrogen will remain as formerly. Nitrates in the single sample of nitrate of soda analyzed, has furnished nitrogen

COMPARISON OF SPECIAL MANURES.

According to their Brands and the Crops for which they are offered.

(See paragraph at bottom of pp. 45 and 48.)

Station No.	Name.	Year.	Nitro- gen.	Phos. acid sol. and rev.	Pot- ash.	Crop.
137	Stockbridge.	1878	5.9	5.4	6.6	} Corn.
195	"	'78	6.2	3.8	7.0	
407	"	'80	4.7	6.0	6.8	
N. J.	"	'80	4.8	7.2	6.2	
476	Matfield.	'80	6.1	2.0	5.3	
379	Mapes.	'80	3.7	10.2	7.2	
N. J.	"	'80	4.0	11.4	4.6	
N. J.	"	'80	3.9	6.5	7.7	
300	Forrester.	'79	5.5	5.3	13.1	
421	"	'80	4.8	6.0	14.6	
	highest	per cent.	6.2	11.4	14.6	} Potato.
	lowest	"	3.7	2.0	4.6	
146	Stockbridge.	'78	3.5	6.4	10.2	
260	"	'79	3.8	7.0	8.8	
409	"	'80	4.1	5.9	8.1	
417	"	'80	3.8	5.2	8.0	
Mass.	"	'79	4.4	3.8	7.6	
116	Forrester.	'78	5.7	7.6	11.4	
282	"	'79	4.6	5.5	9.1	
304	"	'79	4.8	5.3	10.3	
420	"	'80	4.8	5.4	11.3	} Onion.
128	Mapes.	'78	3.7	4.5	14.8	
376	"	'80	3.9	8.6	7.7	
	highest	per cent.	5.7	8.6	14.8	
	lowest	"	3.5	3.8	7.6	
258	Stockbridge.	'79	3.9	6.4	8.3	
363	"	'80	3.1	5.3	7.9	
259	Mapes.	'79	5.7	6.2	7.5	
301	Forrester.	'79	7.4	4.5	7.4	
416	"	'80	7.4	4.6	7.3	
	highest	per cent.	7.4	6.4	8.3	
	lowest	"	3.1	4.6	7.3	

Station No.	Name.	Year.	Nitro- gen.	Phos. acid. sol. and rev.	Pot- ash.	Crop.
274	Stockbridge.	'79	5.7	1.4	7.4	} Tobacco.
435	"	'80	6.1	6.1	5.6	
Mass.	"	'79	6.7	1.9	9.4	
473	Forrester.	'80	5.5	3.9	9.7	
	highest	per cent.	6.7	6.1	9.7	
	lowest	"	5.5	1.9	5.6	
175	Stockbridge	'78	4.4	7.8	6.5	} Strawberry.
284	Forrester.	'79	3.0	10.3	5.9	
472	"	'80	2.9	8.9	8.7	
	highest	per cent.	4.4	10.3	8.7	
	lowest	"	2.9	7.8	5.9	
471	Forrester.	'80	4.5	4.6	5.6	Wheat.
475	"	'80	5.4	4.3	11.3	Rye.
500	"	'80	5.3	4.8	9.5	Rye.
426	"	'80	6.6	5.0	9.2	Oat.
Mass.	Stockbridge.	'79	5.4	4.6	6.2	Oat.
	highest	per cent.	6.6	5.0	11.3	
	lowest	"	4.5	4.3	5.6	
144	Mapes.	'78	4.3	6.0	3.7	Grass & grain top dr.
377	"	'80	4.7	7.5	6.6	" " "
197	Stockbridge.	'78	8.7	2.1	10.4	Grass top dr.
280	"	'79	6.1	4.1	7.5	" "
201	Forrester.	'78	5.7	4.1	12.1	Grass.
474	"	'80	5.4	2.1	7.5	"
469	"	'80	4.4	5.7	12.6	Lawn Dressing.
181	Bowker.	'78	8.0	5.2	6.4	" "
	highest	per cent.	8.7	7.5	12.6	
	lowest	"	4.3	2.1	3.7	
193	Stockbridge	'78	4.6	5.6	7.2	Kitchen Garden.
196	"	'78	5.1	4.1	7.7	Squashes.
413	Bowker.	'80	3.0	5.9	9.8	Kitchen Garden.
281	Forrester.	'79	6.3	6.1	7.4	Cabbage.
423	"	'80	5.6	6.3	8.2	"
	highest	per cent.	6.3	6.3	9.8	
	lowest	"	3.0	4.1	7.2	

at twenty-eight cents, but since probably the price will fluctuate, no change in its trade-value appears to be called for.

Soluble Phosphoric acid has been procurable in 1880 as in 1879, at a cost of ten cents per pound in the imported superphosphate 436, see p. 23. In our home-made manipulated fertilizers it still costs twelve and one-half cents, and that may therefore remain as the Station valuation.

Reverted Phosphoric acid in the various manipulated fertilizers has cost no less than formerly, and the former price, nine cents, is retained.

Insoluble Phosphoric acid in dry fish and in the different grades of bone, has cost one cent per pound less than last year's valuation. See Table, p. 31.

Potash, in nearly pure, high grade sulphate, is reckoned at seven cents, and in muriate, at three and one-half cents per pound. p. 39. In low grade sulphates containing magnesium chloride, and in kainite, it would probably be fair to reckon potash at five and one-half cents. For comparison of the trade-values employed in 1880 with those it is proposed to use in 1881, see pp. 19 and 21.

SWAMP MUCK AND PEAT.

Fifteen samples of this material have been subjected to analysis.

446	Swamp Muck No. 1.	Upper stratum.	} From farm of Messrs. John and Andrew Jackson, Wilton. Sent by D. H. Van Hoosear, Secretary Farmers' Club, East Wilton.
447	Swamp Muck No. 1.	Lower stratum.	
448	Swamp Muck No. 2.		
449	Cured Muck.	} Sent by S. B. Wakeman, Saugatuck.	
450	Fresh Muck.		
451	Muck.	Sent by G. W. Stanley, New Britain.	
452	Fibrous Muck, from above 453.	} Sent by Henry Hine, Oxford.	
453	Bottom Muck, from below 452.		
454	Mucky soil of drained meadow, from Augustus Storrs, Mansfield.		
465	Swamp Muck, from Ed. C. Birge, Southport.		
467	A, Swamp Muck.	Upper layer.	} From Lewis Davis, Milford.
467	B, Swamp Muck.	Lower layer.	
492	Muck, from W. E. Simonds, Canterbury.		
510	} Muck from H. A. Slater, North Manchester.		
511			

Samples 446, 447 and 448 are from a swamp of ten acres, owned by Messrs. John and Andrew Jackson of Wilton. 446 and 447 are from the head of the swale, the former from the surface, the latter from a lower stratum. 448 was taken from the same swale one-half mile distant and at a lower level. Muck from both localities has been used for many years as an absorbent, and also has been applied in spring direct to crops after

having been dug in fall and exposed to air and frost during winter. 446 and 447 have given very good results. 448 has been less valuable.

The analyses show large differences of composition, in the fresh samples. We observe, first, that 446 is a very pure muck and quite fully saturated with (eighty per cent.) of water. 448 is drier and contains forty-five per cent. of soil and mineral matter, while 447 stands intermediate. If the three were applied in corresponding states of dryness, we can see that in the first two we should have much more organic matters, with more nitrogen, and likewise more lime than in the last. This appears from the figures in the table, showing the composition of the dry, water-free mucks, p. 54.

The *per cent.* of nitrogen, and that of lime in the dry samples may be taken as fair measures of their relative value. 446 ranks accordingly among the best, while 448 is nearly the poorest of the samples here reported.

The inferiority of 448 is evidently largely due to the fact that nearly three-fourths of it is sand or soil. Reference to the last line of figures in the table shows that the organic matter which it contains is as rich in nitrogen as that of 446. We see, in fact, that in both these and in seven of the other samples the organic matters contain about two and one-half per cent. of nitrogen.

449 and 450, from S. B. Wakeman, of Saugatuck, are, it is understood, two samples from the same bed, the former dug a year ago or more and exposed during the winter, the latter a freshly excavated sample. The cured muck, 449, is used as an absorbent and for composting. The questions asked by Mr. Wakeman are:—

1. "Is the cured muck worth carting 100 rods to use as absorbent and in compost?" and,

2. "Has the muck any value in its fresh state?"

The differences in composition which appear in the undried samples are almost entirely due to their unlike proportions of water, viz: 38 and 85½ per cent. Dry, they agree in containing about 90 per cent. of organic matter with 2.2 per cent. of nitrogen, and about 10 per cent. of ash with 2 per cent. of lime.

To Mr. Wakeman's questions the following answers were given:

1. 449 is well worth carting 100 rods to use as an absorbent. It contains as analyzed, with thirty-eight per cent. water, nearly twice as much nitrogen as good stable manure, and of this there

ANALYSES OF SWAMP MUCK.

The fresh or undried samples contain per cent. :

	446	447	448	449	450	451	452	453	454	465	467A	467B	492	510	511
Water,-----	80.68	62.25	42.19	38.04	88.51	32.08	77.23	70.90	67.26	73.81	87.13	81.36	79.73	50.47	42.34
Organic (vegetable) and volatile matter,-----	15.93	26.33	12.80	55.72	10.40	53.82	21.83	7.55	19.75	23.39	11.55	6.94	16.74	18.96	41.49
Ash, including sand and soil,-----	3.39	11.42	45.01	6.24	1.09	14.10	0.94	21.55	12.99	2.80	1.32	11.70	3.53	30.57	16.17
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
THE ASH CONTAINS,															
Silica and substances insoluble in acid,	2.19	7.66	36.08	3.34	0.42	9.83	0.42	----	7.87	1.63	0.48	10.78	2.63	27.36	13.36
Oxide of iron, alumina and phos. acid,	0.35	0.88	6.32	0.70	0.13	----	0.31	1.61	4.55	0.34	0.20	0.57	0.27	1.73	1.70
Lime,-----	0.44	1.78	0.69	1.32	0.23	1.28	0.09	0.06	0.11	0.38	0.35	0.09	0.42	0.78	0.10
Other matters not separately determ'd,	0.41	1.10	1.92	0.88	0.31	2.99	0.12	----	0.46	0.45	0.29	0.26	0.21	0.70	1.01
Nitrogen (in organic matter),-----	0.41	0.33	0.33	1.36	0.25	0.91	0.24	0.26	0.41	0.60	0.31	0.18	0.44	0.56	0.74
Poisonous iron-salts: soluble in water,	none	none	none	none	none	none	none	trace	much	none	none	none	none	none	none

The dry (water free) mucks contain per cent. :

Organic and volatile matters,-----	82.44	69.48	22.14	89.93	90.51	79.24	95.87	25.95	60.32	89.31	89.74	37.23	82.58	38.28	71.95
Ash,-----	17.56	30.52	77.86	10.07	9.49	20.76	4.13	74.05	39.68	10.69	10.26	62.77	17.41	61.72	28.05
Lime,-----	2.27	4.71	1.19	2.13	2.00	1.88	0.39	0.26	0.33	1.45	2.72	0.48	2.07	1.57	0.17
Nitrogen,-----	2.12	0.87	0.57	2.19	2.18	1.34	1.05	0.89	1.25	2.29	2.40	0.96	2.17	1.13	1.28

The organic matter of the mucks contains per cent. :

Nitrogen,-----	2.57	1.25	2.58	2.44	2.40	1.69	1.10	3.44	2.08	2.57	2.68	2.59	2.63	2.95	1.78
----------------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

can be no reasonable doubt that a good portion would become available to crops, especially after composting with dung and urine. It also contains four times as much lime as stable manure.

2. As to the value of **450**, the fresh dug muck, it would doubtless be serviceable if well pulverized and distributed upon sandy, droughty soil. It contains nothing injurious to vegetation.

The chief advantages of "curing" muck by exposure to air and frost are, 1, pulverization, 2, removal of a share of the useless water, and 3, removal of the soluble poisonous salts of iron. The sample **450**, like all but two of those here reported, is free from injurious iron-salts, and except for the cost of carting its extra water and the convenience of application, it might, most probably, be applied as well fresh as cured.

451, from G. W. Stanley, of New Britain, was a well cured or dried sample, but still retained thirty-two per cent. of water. The composition in the dry state shows it to be rather above medium quality, with 1.9 per cent. lime and 1.3 per cent. nitrogen. Its content of sand and soil (fifteen per cent. or more of the dry muck) depresses the nitrogen, but the organic matter itself contains a less proportion of this element than that of any other sample except **452**.

452 and **453**, from Henry Hine, of Oxford, represent respectively the upper and lower layers of the same bed. **452** was coarse and fibrous from undecayed vegetation. The organic matter of **453** was more fully decomposed but was admixed with clay and fine soil, to the extent of seventy-four per cent. These are the poorest mucks here reported, averaging when water-free but one-third per cent. of lime and one per cent. of nitrogen. The bottom sample contains some soluble and poisonous iron-salts which would disappear by thorough weathering, or more speedily and certainly by composting with ashes, potash or lime. Such muck would probably not pay to apply fresh, except on light, leachy land, and there would be of advantage mainly as an amendment of too great porosity and droughtiness and not as a fertilizer.

454, from the farm of Augustus Storrs, Mansfield, is an interesting sample, as it represents a piece of meadow land that has been drained and cultivated for three or four years, but, as Mr. Storrs reports, all attempts to get crops of buckwheat, corn or turnips have totally failed—even weeds do not grow upon it. The surface of the ground when it dries becomes white as if salt or plaster had been sown upon it.

The barrenness of this soil is due to iron-salts soluble in water, mainly proto-sulphate of iron, the same thing as copperas or green-vitriol, which is present in considerable proportion and which poisons and destroys all vegetation. The remedy is a copious application of leached ashes or lime. Unless there is permanent bottom water also poisoned by iron-salts, the lime will shortly cure the difficulty. The sample is more of a muck than a soil, containing sixty per cent. of vegetable and volatile matters, and not only has excess of iron-salts but is deficient in lime and presumably in other mineral plant food, so that leached ashes would be the most suitable application.

465. This muck, from E. C. Birge, Southport, is seen, from the statement of its composition in the water-free state, to contain nearly ninety per cent. of vegetable matter with 2.3 per cent. of nitrogen, and 1.5 per cent. of lime; it is accordingly of excellent quality. Mr. Birge states that it can be delivered on the adjacent upland at eighteen cents per cart load of twenty-five bushels. Mr. Birge asks:

1. After letting it dry on the upland, will it pay to cart to the yard one-half or three-fourths mile distant for litter?

2. Will it pay to top-dress pastures near the swamp with raw muck?

3. Will it pay to compost with lime at the swamp?

Queries 1 and 3 were answered in the affirmative. In reply to the second question, a doubt as to the advantage of its direct use was expressed. Evidently, however, nothing but actual experience can positively decide these questions, and the answers given, being offered without a careful examination of all the circumstances of the case, are merely opinions that are intended to be safe, but are not expected to be exact.

467A and **467 B**, from Lewis Davis, Milford, are respectively the black upper and brown lower layers of the same deposit. Mr. Davis asked which is the best, and if either or both are worth applying to sandy loam directly or after composting with something besides yard manure.

The analysis indicates the muck to be of the best quality. The lower portion is, however, largely mixed with soil. This renders it less rich in nitrogen and lime, and therefore inferior as a fertilizer; but as the soil it contains is mostly of very fine pulverization, it is not less valuable as an amendment on light, open-textured soils. The best materials next to stable manure to compost with

would be unleached wood ashes, or fresh burned and slacked lime. By slacking the cheapest oyster-shell lime, mixed with say one-tenth as much kainite (potash salts) or low grade sulphate of potash, and composting with the muck, the latter will not only yield its nitrogen rapidly, but its lack of potash, magnesia, etc., will be supplied. To one cord or one hundred bushels of muck, ten bushels of lime may be used.

492, From W. E. Simonds, Canterbury, is also a muck of high quality, judged from the analysis, the dry substance containing over two per cent. each of lime and nitrogen.

510, Sent by H. A. Slater, North Manchester, taken from a ditch at the edge of a swamp of three or four acres which has had some wash from adjacent hillsides, and which yields a light growth of coarse hay. The sample was from a pile dug in the fall of 1879, and hauled in October, 1880, to a barn to be used as an absorbent.

511 is from a depression of three to four acres on high ground, where the wash is less than in the case of **510**. Vegetation is mainly moss with isolated bunches of grass and birch trees. The sample is from a heap that has been dug two years.

510 and **511** are both mixed with a good deal of soil, but still contain more than the average of nitrogen. The 1.57 per cent. of lime in **510** water-free, stands doubtless in connection with the fact that it carries a growth of coarse grass, while the smaller amount (.17 per cent.) in **511** partly explains the absence of grass and prevalence of moss on the swamp from whence it was taken.

In the same stage of dryness **510** is much the richer of the two, notwithstanding it contains more than twice as much soil as **511**.

For full details as to methods of handling and composting, the reader is referred to my Report on Peat and Muck, published in the Transactions of the Connecticut State Agricultural Society for the year 1858, and afterward revised and enlarged and issued by Orange Judd & Co., under the title, "Peat and its Uses as Fertilizer and Fuel."

EXPERIMENTS ON THE EFFECTS OF ALKALIES IN DEVELOPING THE FERTILIZING POWER OF PEAT.

During the summer of 1862, the writer undertook a series of experiments with a view of ascertaining the effect of various composting materials upon peat.

An account of these experiments was published in "Peat and its Uses," and I copy that account here, for two reasons: 1. To show the very positive effect of alkalies in rendering the nitrogen of peat available to vegetation.

2. To illustrate the benefit of pot-experiments when properly made.

The Station ought to carry on such experiments constantly, and is only hindered from doing so by the want of any suitable place for prosecuting them.

Experiments.

Two bushels of peat were obtained from a heap that had been weathering for some time on the "Beaver Meadow," near New Haven. This was thoroughly air-dried, then crushed by the hand, and finally rubbed through a moderately fine sieve. In this way, the peat was brought to a perfectly homogeneous condition.

Twelve one-quart flower-pots, new from the warehouse, were filled as described below; the trials being made in duplicate:

Pots 1 and 2 contained each 270 grams* of peat.

Pots 3 and 4 contained each 270 grams of peat, mixed with 10 grams of ashes of young grass.

Pots 5 and 6 contained each 270 grams of peat, 10 grams of ashes, and 10 grams of carbonate of lime.

Pots 7 and 8 contained each 270 grams of peat, 10 grams of ashes, and 10 grams of slaked (hydrate of) lime.

Pots 9 and 10 contained each 270 grams of peat, 10 grams of ashes, and 5 grams of lime, slaked with strong solution of common salt.

Pots 11 and 12 contained each 270 grams of peat, 10 grams of ashes, and 3 grams of Peruvian guano.

In each case the materials were thoroughly mixed together, and so much water was cautiously added as served to wet them thoroughly. Five kernels of dwarf (pop) corn were planted in each pot, the weight of each planting being carefully ascertained.

* 1 gram = $14\frac{1}{2}$ grains. 1 oz. = $28\frac{1}{2}$ grams.

The pots were disposed in a glazed case within a cold grapery,* and were watered when needful with pure water. The seeds sprouted duly, and developed into healthy plants. The plants served thus as tests of the chemical effect of carbonate of lime, of slaked lime, and of salt and lime mixture on the peat.

The plants were allowed to grow until those best developed, enlarged above, not at the expense of the peat, etc., but of their own lower leaves, as shown by the withering of the latter. They were then cut, and, after drying in the air, were weighed, with the subjoined results.

Nos.	Medium of growth.	Weight of crops in grams.	Comparative weight of crops, the sum of 1 and 2 being taken as unity.	Ratio of weight of crops to weight of seeds, the latter as- sumed as unity.	
1 } 2 }	Peat alone.	1.61 } 2.59 }	4.20	1	2½
3 } 4 }	Peat, and ashes of grass.	14.19 } 18.25 }	32.44	8	20½
5 } 6 }	Peat, ashes and carbonate of lime.	18.19 } 20.25 }	38.44	9	25½
7 } 8 }	Peat, ashes and slaked lime.	21.49 } 20.73 }	42.22	10	28½
9 } 10 }	Peat, ashes, slaked lime and salt.	23.08 } 23.34 }	46.42	11	30½
11 } 12 }	Peat, ashes and Peruvian Gu- ano.	26.79 } 26.99 }	53.78	13	35½

Let us now examine the above results. The experiments 1 and 2 demonstrate that the peat itself is deficient in something needful to the plant. In both pots, but 4.2 grams of crop were produced, a quantity two and a half times greater than that of the seeds, which weighed 1.59 grams. The plants were pale in color, slender, and reached a height of but about six inches.

Nos. 3 and 4 make evident what are some of the deficiencies of the peat. A supply of mineral matters, such as are contained in all plants, being made by the addition of ashes, consisting chiefly of phosphates, carbonates, and sulphates of lime, magnesia, and potash, a crop is realized nearly eight times greater than in the previous cases; the yield being 32.44 grams, or 20½ times the weight of the seed. The quantity of ashes added, viz: 10 grams, was capable of supplying every mineral element, greatly in excess of the wants of any crop that could be grown in a quart of soil. The plants in pots 3 and 4 were much stouter than those in 1 and 2, and had a healthy color.

* To the kindness of Joseph E. Sheffield, Esq., of New Haven, the writer is indebted for the use of the glass house for setting up these experiments. The young vines did not seriously obstruct the sunlight.

The experiments 5 and 6 appear to demonstrate that carbonate of lime considerably aided in converting the peat itself into plant-food. The ashes alone contained enough carbonate of lime to supply the wants of the plant in respect to that substance. More carbonate of lime could only operate by acting on the organic matters of the peat. The amount of the crop is raised by the effect of carbonate of lime from 32.44 to 38.44 grams, or from $20\frac{1}{2}$ to $25\frac{1}{2}$ times that of the seed.

Experiments 7 and 8 show, that slacked lime has more effect than the carbonate, as we should anticipate. Its influence does not, however, exceed that of the carbonate very greatly, the yield rising from 38.44 to 42.22 grams, or from $25\frac{1}{2}$ to $28\frac{1}{2}$ times the weight of the seed. In fact, quicklime can only act as such for a very short space of time, since it rapidly combines with carbonic acid, which is supplied abundantly by the peat.

In experiments 7 and 8, a good share of the influence exerted must therefore be actually ascribed to the carbonate, rather than to the quicklime itself.

In experiments 9 and 10, we have proof that the "lime and salt mixture" has a greater efficacy than lime alone, the crop being increased thereby from 42.22 to 46.42 grams, or from $28\frac{1}{2}$ to $30\frac{1}{2}$ times that of the seed.

Finally, we see from experiments 11 and 12 that in all the foregoing cases it was a limited supply of nitrogen that limited the crop; for, on adding Peruvian guano, which could only act by this element (its other ingredients, phosphates of lime and potash, being abundantly supplied in the ashes), the yield was carried up to 53.78 grams, or $35\frac{1}{2}$ times the weight of the seed, and 13 times the weight of the crop obtained from the unmixed peat.

INFLUENCE OF LIME ON THE EFFECT OF FERTILIZERS.

Relative Fertilizing Value of Soluble and Reverted Phosphoric Acid.—In March last, Mr. S. B. Wakeman, of Saugatuck, inquired of the Station, "if caustic lime be put on the ground and superphosphate of lime also applied, what action has the lime on the soluble phosphoric acid?"

Mr. T. B. Wakeman, of Green's Farms, wishing to manure three acres of onion ground heavily with stable manure, blood guano and superphosphate, and also to apply eight barrels of slacked

lime and 1500 pounds of salt, for the purpose of destroying worms, likewise inquired whether the lime would injure the effect of the superphosphate.

These inquiries touch several important points, viz: the effect of caustic lime on the nitrogen and phosphoric acid of fertilizers, and consequently the relative value for fertilizing purposes of the various forms or states of phosphoric acid. Before reproducing here the brief answers given to the above inquiries, a short discussion of these points is offered.

If we mix lime intimately with manures containing ammonia-salts, the ammonia is set free as a gas and escapes into the air.

Again, if we mix lime with a fertilizer containing phosphoric acid, or phosphates soluble in water, there is formed so-called reverted phosphoric acid, i. e., phosphate of lime insoluble in water.

From these facts it has been inferred that lime should not be mixed with fertilizers containing either ammonia-salts or soluble phosphoric acid. This is, in fact, generally speaking, sound doctrine as applied to mixing fertilizers with lime before application. It should be remembered, however, that few fertilizers contain much ammonia-salts. Stable manure contains but three or four pounds of ammonia to the ton, and the ordinary superphosphates and special manures rarely contain more than two or three per cent. of ready-formed ammonia. On mixing with lime, enough ammonia might be liberated to affect the sense of smell, more or less powerfully, but the loss thus occasioned would be in most cases comparatively trifling, and far smaller than might be inferred from the odor, because the nose is a very sensitive test for ammonia, and because the intermixture and contact of the lime and the manure would be extremely rough and incomplete, and therefore such a mass might be left for days, giving off the smell of ammonia all the time, and then have lost but a fraction of that originally present. It has also been taught that it is a wasteful or injurious practice to apply lime to *the land* at or near the time of dressing it with stable manure, guano and superphosphates. This teaching is not always or altogether correct.

The mixing together, in the soil, of lime and fertilizers containing ammonia-salts, can scarcely occasion much loss, because the soil, by its moisture, by its humus, i. e., vegetable matter in decay, and by the absorbent silicates, which are never absent from earth that has any moderate productive power, is ready to take up at once the liberated ammonia, and prevent any sensible waste.

The very slight escape of ammonia that would result from applying together lime and manure containing ready-formed ammonia may, therefore, oftentimes be more than compensated by the farmer's convenience, or by other actual or prospective advantages. To mix together lime and a soluble phosphate, (one containing soluble phosphoric acid), at first sight would appear to be a grievous error, because the soluble phosphate is obtained by acting on an insoluble phosphate with oil of vitriol, at such an expense that one pound of soluble phosphoric acid costs as much as three or four pounds of insoluble.

To mix the soluble phosphate with lime is said to undo what was done by the oil of vitriol, and this is true in a sense, and to a degree. But the original insoluble phosphate, whether South Carolina rock phosphate, Canadian apatite, bone black, or whatever else, is a very different thing from the precipitated phosphate which results from the action of lime on soluble phosphoric acid. The former is coarse, dense and very insoluble, and under ordinary circumstances without immediate sensible effect on crops. The latter is an efficient fertilizer, quite similar in nature or at least in effects, to the phosphates of the fertile soil, being excessively fine in its division and no doubt readily taken up by the roots of plants. On the other hand, soluble phosphoric acid in some circumstances may act detrimentally, so that in such circumstances a superphosphate, mixed with lime at or previous to application, would do better than when applied without lime.

It was long ago remarked in agricultural practice in France, that certain low-grade native phosphates, which could not be economically made into superphosphates, gave little immediate or perceptible benefit when applied finely ground to various loamy or sandy lands, but on *certain other soils, rich in humus*, operated promptly and strikingly. This fact indicates that insoluble phosphates are made soluble and available to vegetation by the various acids resulting from vegetable decay. Quite in harmony with this is the experience of Dr. Ravenel, of Charleston, S. C., who has found that finely-ground Charleston phosphate rock is quite assimilable by vegetation, when applied in conjunction with vegetable matter, obtained by plowing under a large growth of the Southern pea, or letting it decay on the surface of sandy and otherwise nearly worthless land. In fact, the decaying vegetation would appear to dissolve the phosphate as effectually and more economically than sulphuric acid. That is to say, a better

economical result is obtained, by applying a dollar's worth of fine ground phosphate rock with a decaying green crop, than by using the same worth of artificially dissolved phosphate, the latter containing about one-third or one-fourth as much phosphoric acid as the former.

Various experimenters have, in fact, found that humus dissolves the insoluble crude phosphates. Quite recently M. Beletzky has observed that a mineral phosphate (phosphorite) containing fifteen per cent. of phosphoric acid, put in contact with five times as much peat, (swamp muck), in presence of water, yielded in five days one-eighth of its phosphoric acid in solution to the liquid.

Hon. S. L. Goodale, for many years secretary to the Board of Agriculture of the State of Maine, states that some farmers of his acquaintance prefer the "Cumberland Phosphate," made at Portland, I believe, after it has, by keeping, suffered the "reversion" of nearly all its soluble phosphoric acid.

Various pot and field experiments, recently made in Germany and Belgium, have shown in some cases an equally good or even better effect from reverted than from soluble phosphoric acid. On a "sterile lime sand," Dr. Wein, of Munich, found that reverted phosphoric acid gave considerably better results than soluble phosphoric acid, or than soluble superphosphate of lime. It would thus appear that in some cases it may be no disadvantage to apply lime and superphosphate together; in other cases it may be a positive advantage. On the other hand, in many instances, the superiority of soluble over reverted and insoluble phosphates would seem to have been fully demonstrated, not only for sandy, loamy and clayey soils, but also for those rich in humus. In seventeen field trials, recently reported from the Experiment Station at Kiel, in Holstein, the result is that on the loamy soils, in general, a pound of reverted phosphoric acid gave about half the effect obtained from the same amount of soluble. On sandy soils, adjacent to moorland and rich in humus, the soluble operated decidedly better than the reverted. On newly reclaimed moorland, the reverted gave better results than the soluble, but on moorland that had been limed, the soluble gave the better results.

Exceptions to the most general rule were not wanting. In one case reduced phosphate surpassed soluble on a loam. Fleischer, near Bremen, found in a series of nine comparative trials on five moor soils, that the soluble phosphate surpassed the reverted, strikingly in one case, was strikingly surpassed in one case, while in seven instances both operated about equally well.

From a careful review of the facts now on record bearing on this question, it is plain that we have not the means of deciding with certainty when and why one or the other forms of phosphoric acid is best. The recently published experiments are more suggestive than conclusive. The subject has been engaging attention at the German Stations, and doubtless we shall soon obtain positive information on these points.

So far as can be concluded from the data at hand, it is probable that soluble phosphoric acid is uneconomical on soils containing superabundant humus, because such soils already have a surplus of acid. In them not only do carbonic acid and the peculiar acids of humus abound, but even acetic acid (the acid of vinegar) and similar equally energetic acids, are likely to be formed under a favorable temperature.

It has been demonstrated that agricultural plants are injured or destroyed by either a slight amount of free acid or free alkali in contact with their roots. Therefore, when the soil is itself acid, any added acid, (and soluble phosphates are usually acid), increases an already present or impending evil.

Soils rich in humus do not, however, necessarily have a surplus of acid. They may contain originally or may have added to them carbonate of lime in such quantity that the development of free acid is rendered impossible. In fact, such soils may become alkaline in hot, moist weather from the development of ammonia. The circumstances in which lime may act detrimentally on a superphosphate, are probably when the lime is present in relatively large quantity, and the soil is at the same time deficient in organic matter.

To Mr. S. B. Wakeman's inquiry, was answered substantially as follows: When *soluble phosphoric acid* is put in the soil, it gradually passes into the state of *reverted phosphoric acid*, by the action of the lime and iron of the soil. If caustic lime be applied to the land, the process is simply hastened. Whether or not this effect of the caustic lime is a disadvantage or an advantage, appears to depend on circumstances. In mucky soil or soil containing a good deal of vegetable matter, reverted phosphoric acid oftens works as well, or even much better, than soluble phosphoric acid. In fact, soluble phosphoric acid should be cautiously applied on such land. On soil where bone does little good—dry, sandy loam with little vegetable matter—soluble phosphoric acid usually operates well, better than reverted. The inference is that

lime would work well with superphosphate on soil containing abundant humus, but had better not be applied at the same time with soluble phosphoric acid on dry lands deficient in vegetable matters. Lime is best applied on grass; superphosphate on grain or hoed crops. I don't suppose, however, that on land in good condition it would ordinarily make a difference worth considering, whether the two be used together or separately, but in some cases the lime operates against the superphosphate.

To Mr. T. B. Wakeman was answered: It is not probable that a moderate application of salt and lime will damage the manure and phosphate on your onion land to a degree worth mentioning. If they could be put on some time apart, it would perhaps be better, but even if applied at the same time and at once worked in, no serious loss or detriment could occur on well-manured loamy land, suitable for onions.

Mr. T. B. Wakeman writes, Dec. 9, 1880, that the use of lime and salt has been, this season, quite effectual in staying the ravages of the worms, which otherwise have made serious havoc with the onion crop. He states, further, that in his opinion the caustic lime has not interfered with the action of the manures, and says that next Spring, lime and salt will be considerably used, both on onion and strawberry land, for the purpose of destroying worms.

Where it is intended to apply potash-salts as a fertilizer, it would be an advantage to use muriate of potash, instead of salt (muriate of soda) in slacking the lime. Muriate of potash would doubtless have, in connection with lime, substantially the same effect in destroying worms that salt exerts, and would be afterwards much more serviceable to the crop than common salt can be, because considerable quantities of potash are indispensable to all plants, while soda is either not necessary to their growth, or is required in only very small amount.

LEATHER CHIPS.

The Station has had several inquiries as to the value of Leather Chips for fertilizing purposes. Leather chips contain usually 5 to 8 per cent. of nitrogen, but this nitrogen is totally unavailable to vegetation unless the leather is brought into a state of decay or is acted upon by some powerful chemical agent. Leather is,

however, specially prepared to resist decay, and hence chips of it, when brought into the soil, are very slow to benefit vegetation. The activity of leather is hastened by fine division, but there has been devised no ready and cheap means of pulverizing so tough a substance. It may indeed be rendered brittle by roasting at a moderate heat and then may be easily ground to powder. Prof. F. H. Storer has made a series of valuable pot-experiments for the purpose of testing the effects of raw and roasted leather on vegetation. These investigations, published in the Bulletin of the Bussey Institution, vol. II, pp. 58-71, 1877, have demonstrated that raw sheep-skin and sole-leather are totally incapable of feeding plants, are in fact rather detrimental to vegetation. The experiments likewise prove that roasted leather, while it shows some slight nourishing value, is still comparatively so inert that it can scarcely have any definite money value as a manure. It is in fact no better fertilizer in respect to nitrogen supply, than simple peat.

It is therefore evident that leather is not of sufficient worth as a fertilizer to have a commercial value put upon it for that purpose. Nevertheless, just as the nitrogen of peat may be brought into an available condition by composting with alkaline matters, so that of leather may be transformed, in part at least, into plant-food, and by similar means.

If leather chips be boiled in a strong potash-lye, ammonia is given off copiously, and while the farmer cannot use this fact as a method of utilizing leather, he may no doubt safely infer from it that leather chips are a serviceable ingredient of the compost, in which on the one hand, urine and ammonia-yielding animal matters, or, on the other, lime and ashes or salt and lime are ingredients. In the ordinary compost, leather chips require a long time, a year or so, to become properly disintegrated. The oil in leather hinders the penetration of water and thus opposes decay. Drenching the leather with a moderately strong potash-lye, which dissolves the oil, would therefore appear to be a useful preliminary in composting it, but the question how far such expedients can be economically resorted to on the farm, is one that experience can only determine.

By heating leather chips mixed with alkali (lime and soda) to redness, all the nitrogen may be extracted in the form of ammonia, and it is perhaps not improbable that this process might be carried out on a manufacturing scale with a profit, where leather refuse is largely accumulated.

APPLE POMACE.

The question whether Apple Pomace has any fertilizing value has been proposed to the Station, and a sample was received from D. H. Van Hoosear, of East Wilton. Since Prof. F. H. Storer has examined this material, it appeared unnecessary to analyze the sample. Practical trial has established that there is very trifling fertilizing value in apple pomace, and the analysis sustains and explains this view. Prof. Storer found in it as made from Baldwin apples:*

Water,.....	77.21
Organic matter,†	22.29
Ash,.....	.50
	<hr/>
	100.00
† With nitrogen,.....	.16

The ash is nearly half potash. The organic matter consisting mainly of carbohydrates, might be serviceable in a compost, in the same sense that the organic matter of swamp muck or saw dust may be, but evidently there is nothing in the apple pomace to justify much handling of a material which consists so largely of water.

SOILS.

Detailed analyses of four samples of soil have been made in the hope of learning the causes of their unproductiveness. A sample of clay has also been examined.

489 and 490 are samples from adjoining fields belonging to the farm of D. H. Van Hoosear, president of the Wilton Farmers' Club. Both are what would be termed sandy loams with sufficient vegetable matter to give them a rich dark appearance when wet. The subsoil is sandy or loamy. They are said not to need draining, are not shaded, and there is no apparent reason why the soil whence these samples were taken should not be as good as the surrounding land, which is in part remarkably productive. Mr. Van Hoosear states that 489 during fourteen years of his ownership has been manured heavily, but all crops, grass, grain, corn, potatoes, have not been up to standard. As to 490 he says that during forty years he has not been able to get a good crop, although all crops have been tried, with heavy applications

* Bulletin of the Bussey Institution, vol. I, p. 365.

of stable manure, and as the land was light cattle have been foddered on it to make it more compact, but this has been of no avail.

In order to appreciate the analytical results we must compare them with the composition of soils of known character for fertility. In the Table, page 70, are given analyses of two soils, one a naturally poor sandy loam made capable of yielding a ton of tobacco per acre by copious manuring, the other a naturally fertile prairie soil. The former was analyzed by Dr. C. U. Shepard, Jr., State Chemist of South Carolina, to whom I am indebted for the valuable series of papers in which it was published. The latter was analyzed by Dr. Voelcker, Chemist to the Royal Agricultural Society of England, and is copied from Caird's "Prairie Farming in America." The analyses were all made, I believe, by essentially the same method and are fairly comparable.

The analysis of the soil and its hydrochloric solution as given on page 70, totally fails to give any explanation of the infertility of **489** and **490**. Notwithstanding these soils with 12 and 8 per cent. of water are compared with the nearly or quite dry tobacco and wheat soils, they surpass the tobacco soil in organic matters, in nitrogen, in potash, in soda, in magnesia, and in sulphuric acid. **489** surpasses the tobacco soil in lime and contains nearly as much phosphoric acid. **490** has indeed less lime but has more phosphoric acid than the tobacco soil. **489** and **490** surpass the prairie soil in quantity of organic matter, of potash, soda and magnesia. Both contain less lime and sulphuric acid, **489** has a little less phosphoric acid and nitrogen, **490** has half as much nitrogen but more phosphoric acid than the prairie soil.

Some years ago M. Grandeau studied the composition of certain soils which possessed very different productive powers but which by the usual method of chemical analysis (of the acid solution) gave similar results. He found, however, that, after removing carbonates by a very dilute acid, and treating the residues with ammonia, solutions were obtained in which potash, phosphoric acid, etc., together with a black organic matter, or humus, "*matière noire*," were present in quantity corresponding to the fertility of the soil.

Grandeau has in fact been led by these studies to adopt the theory that in fertile soils generally the presently available plant-food exists in combination with humus, and that in the ammonia extract of a soil we have a comparatively ready and certain

measure of its fertility. Since these soils from E. Wilton contain a large proportion of organic matter, it was decided to examine them after the method of Grandeau, and the table on page 71 gives the results, where they may be compared with Dr. Shepard's analysis by the same method of the N. Hadley tobacco soil.

It is seen that **489** and **490** yielded as much or more ammonia extract than the tobacco soil, and that the amounts of potash extracted were quite the same, but that there was in comparison to the tobacco soil a decided deficiency of lime and magnesia.

Without at once concluding that Grandeau's notion of the value of the analysis of the ammonia-extract is correct applied to these soils, it certainly would be interesting to try upon them moderate applications of lime either caustic or air-slacked. If the result were favorable it would go to sustain Grandeau's theory.

I should add that no traces of poisonous ingredients—soluble iron-salts—could be found.

Sample **493** was received from Hon. T. S. Gold, Secretary of the Board of Agriculture, who gives the following history of it :

"The earth which I send you was taken from the surface soil where formerly stood an old stable which was kept full of cows every winter for some fifty years. The stable was removed in the spring of 1878, and the manure which had accumulated under the stable-floor taken away down to the loamy soil. The place has been exposed to the weather for over two years yet nothing grows upon it. This sample was taken in September, after a rain which wet down some six inches, the season having been rather dry. At the depth of two or three feet we find hardpan, so there could not be much leaching, and as the spot is nearly level not much washing could take place. We have always found the earth from under old buildings which have contained cattle a powerful fertilizer, but expected the rains of two years would reduce its strength so that it would allow something to grow.

Some twenty years ago I cleared away another old stable and there observed the same barrenness for several years. Now the spot cannot be determined by its vegetation."

493 manifests, by the analysis of its acid solution, no deficiency of any mineral element. Its ammonia-extract however, page 71, contains but little lime and magnesia. What perhaps explains its present infertility is the comparative absence of nitrogen. This extremely interesting fact is the more surprising because the soil has been during the winters of half a century constantly charged

ANALYSES OF SOILS.

Solution in hydrochloric acid.

	Well manured tobacco soil, North Hadley, Mass.	489 E. Wilton, Ct.	490 E. Wilton, Ct.	493 W. Cornwall, Ct.	503 East Hartford, Ct.	491 E. Wilton, Ct.	Best wheat soil, Illinois.
Moisture, -----	1.096	12.100	8.380	13.200	10.715	.840	Dried
*Organic and volatile matters, ---	2.763	8.350	6.000	2.140	4.050	1.850	5.688
†Potash, -----	.037	.122	.100	.775	.048	.417	.043
†Soda, -----	.025	.074	.054	.053	.035	.062	.012
†Lime, -----	.188	.253	.117	.295	.040	.180	.505
†Magnesia, -----	.205	.513	.513	.493	.092	.404	.042
†Oxide of iron and alumina, -----	1.701	4.978	5.401	5.320	2.116	5.466	3.575
†Sulphuric acid, -----	.031	.043	.031	.022	.056	.005	.134
†Phosphoric acid, -----	.219	.178	.285	.203	.295	.091	.232
Carbonic acid and chlorine, -----	.011	----	----	----	----	----	.235
Sand, silica and insoluble silicates,	93.724	73.389	79.119	77.499	52.553	90.685	89.471
	100.000	100.000	100.000	100.000	100.000	100.000	100.000
*Containing nitrogen, -----	.103	.264	.167	.061	.103	trace	.300†

† Soluble in cold hydrochloric acid. In case of 489 to 491 the acid was applied for the time and of the strength directed by Wolff.

The same I suppose is true of the other soils.

† In this analysis nitrogen was not determined: the figure given is the average found in several similar soils by Dr. Voelcker.

ANALYSES OF SOILS.

Ammonia-extract.

Well manured tobacco soil, North Hadley, Mass.				
	489	490	493	
Humus in ammonia extract. -	1.000	2.190	1.633	.072
Ash " " " " -	.319	.344	.293	.556*
Containing:				
Silica, -----	.039	.042	.031	.142
Oxide of iron and alumina, ---	.179	.148	.222	
Lime, -----	.035	.005	.003	.009
Magnesia, -----	.119	trace	trace	.004
Potash, -----	.007	.009	.008	.032
Phosphoric acid, -----	.097	.083	.059	.098
Sulphuric acid, soda, &c., by difference, -----	.022	.026	.044	.049
	.319	.344	.293	.556
Total ammonia extract (<i>matière noire</i>), -----	1.319	2.534	1.926	.628

* The ammonia extract contained much fine clay which could not be separated by filtration.

with cattle urine, and unless some special cause existed for the dissipation of this element, the sample should contain much more nitrogen than is commonly found in soils.

The very natural supposition that the barrenness of this earth is due to an excess of soluble plant-food, would appear from the analysis to be the reverse of true. The soil as analyzed is rather unproductive from deficiency than from surplus of nitrogen; probably there is deficiency of presently available lime.

The soil was tested for poisonous salts and a very minute trace of protosulphate of iron was detected, but the proportion was altogether too insignificant to affect vegetation. Evidently the carbonate of ammonia which results from the decay of urine has acted upon the original organic nitrogen of the soil and rendered it soluble just as we have seen that lime acts on the nitrogen of peat. The soluble matters have leached away through the clay subsoil doubtless because of the physical effect which dissolved salts have in coagulating clay and rendering it penetrable. Not only has nitrogen thus disappeared, but the carbonate of ammonia has carried off in solution a large share of the humus originally present and with it the alkalies and other plant-food which are found in Grandeau's ammonia-extract. The soil illustrates in its present barrenness the effects of too much saline and ammoniacal manures,

and serves perhaps to explain the exhaustion which has been observed to follow a too heavy course of Peruvian Guano.

This soil—which has resulted from the disintegration of granitic rocks and exhibits abundance of feldspar and mica—is naturally rich and will shortly recover a good supply of the ash-elements of plant-food by the weathering of its minerals. It would seem that the spot whence the sample came needs nothing but nitrogen in order to become again productive in a year or two.

It is, however, possible that the soluble saline matters which we should expect to find in a soil that has been so liberally manured with urine, have been merely washed into the subsoil by the heavy rain which fell just before the sample was taken, and would, on recurrence of dry weather, ascend with the evaporating water to the surface, and accumulate there in quantity sufficient to injure vegetation.

The sample 503 is from a spot in a tobacco field, the property of Mr. George Abbey, of East Hartford, which is stated to be unproductive notwithstanding various and copious manurings. The plants are said to do well for a time after setting out, but in a few weeks become discolored and blighted and shortly perish. The soil contains no poisonous salts. The analysis of the acid solution reveals no deficiency except perhaps that of lime. Nitrogen is present in fair proportion. The sample supplied was not sufficient for studying the ammonia-extract. As I informed Mr. Abbey before undertaking the analysis, the failure of the tobacco plants as he described it pointed rather to a physical than a chemical difficulty. The blight is such as would result from a failure of water supply which might be due either to a bed of hardpan or of open gravel at a little depth.

491 is a sample of "clay" sent by D. H. Van Hoosear with regard to which the question was raised whether it would have any value as a fertilizer. As a soil it is seen to be rather rich in potash but is destitute of nitrogen and deficient in phosphoric acid. It has in fact nothing to recommend it as a fertilizer, although it might be useful to amend the texture of a coarse leachy soil. It is not, in fact, strictly speaking, a clay, i. e., it contains no considerable amount of those exceedingly fine matters which confer plasticity on clays, but is merely a fine silt or sand.

The analyses of Connecticut soils hitherto made show, as might be predicted from a knowledge of the rocks and minerals whence they are derived, that they commonly contain abundance

of potash derived from the feldspar of our rocks and of magnesia coming from the mica (or isinglass) which is found in our granites and schists. Lime though not entirely deficient in most cases is not abundant, as is further evidenced by the fact that the water of our streams and springs is commonly soft. Whether or not these elements exist in presently available condition depends upon the texture of the soil, the supply of humus and the cropping they have been subjected to.

FLORIDA MAGNESIAN LIMESTONE.

A sample of limestone from Orange County, Florida, was sent to the Station by Charles E. Lord, Secretary of the Farmers' Club at Chester, who writes: "Several of our towns-people are interested in Orange groves in Florida, and would be pleased to learn your opinion of the fertilizing value of this rock, which is found there in large quantities, and could be got out and transported at about the same cost as the gypsum of Nova Scotia. Would it be valuable as a top-dressing about orange trees, and would it compare with gypsum and wood ashes as an application to onions?"

The analysis of the rock gave the subjoined result :

Silica and matter insoluble in acids,	9.89
Iron oxide,	trace
Lime,	29.99
Magnesia,	9.98
Potash,	0.16
Soda,	0.41
Sulphuric acid,	0.36
Phosphoric acid,	0.95
Chlorine,	trace
Carbonic acid and water (by difference),	48.26
	<hr/>
	100.00

The rock consists accordingly, in round numbers, of:—

Carbonate of lime,	52 pr. ct.
Carbonate of magnesia,	21
Phosphate of lime,	2
Sulphates and carbonates or silicates of potash and soda,	1
Silica, sand and insoluble matters,	10
Water,	14
	<hr/>
	100

The rock is a magnesian limestone. Its phosphate of lime would be worth, commercially, \$1.00 per ton of the pulverized rock. The alkali-salts are present in too small quantity to have much effect on the fertilizing value. On soil deficient in lime and magnesia, this rock, either pulverized or burned, would under judicious application, in connection with organic matter, make a serviceable fertilizer. Since lime is the chief ash-element of all trees, a top-dressing of the pulverized or of the burned rock, after air-slacking, would probably be of benefit to orange trees. It can hardly be an efficient substitute for gypsum and wood ashes, applied to onions.

FODDER AND FEEDING STUFFS.

Seventeen samples of Feeding Stuffs have been analyzed, viz:

- 9 of maize; 2 of meal, and 7 of kernel.
- 2 of hay.
- 2 of wheat flour.
- 2 of cotton seed meal.
- 1 of dried brewers' grains.
- 1 of vegetable-ivory dust.

Besides the above, *Bowker's Bone Meal for Cattle* has been examined, and already noticed under Fertilizers, see p. 31, where its valuation is considered.

As in former Reports, I give here a few pages explanatory of the analysis of Fodder and Feeding Stuffs. The recent publication of Dr. Armsby's *Manual of Cattle Feeding*,* enables me to refer to that book for further information on these and other points connected with the composition and use of feeding stuffs.

It is chiefly owing to the investigations that have been carried on in the European Experiment Stations, that the chemical analysis of an article of cattle food may be usefully employed in fixing its nutritive value and place in the feeding-ration, and also in deciding how much the farmer can afford to pay for it, or at what price, and to what extent he can substitute it for other materials customarily used.

* *Manual of Cattle Feeding, a Treatise on the Laws of Animal Nutrition and the Chemistry of Feeding Stuffs in their application to the Feeding of Animals. With Illustrations and an Appendix of useful Tables.* By HENRY P. ARMSBY, Chemist to the Connecticut Agricultural Experiment Station. New York: John Wiley & Sons. 15 Astor Place. 1880.

In order to make our analyses of cattle feed directly useful, it is needful to adduce some of the results of the prolonged study of this subject made in other countries.

The following Table of the Composition and Contents of Digestible Nutritive Ingredients and Money Value of some of the most important Feeding Stuffs (page 78), is taken from the German of Dr. Emil Wolff, of the Agricultural Academy at Hohenheim, and represents the most recent and most trustworthy knowledge on these subjects.*

The *composition* of feeding stuffs, as here stated, is the *average* result of the numerous analyses that have been made within twenty-five years, mostly in the German Experiment Stations.

In his Manual, Dr. Armsby has adopted the Table of Kühn, who gives essentially the same averages as Wolff, and in addition shows the range of composition by stating the greatest and smallest per cent. of each ingredient.

The *quantities of digestible nutrients* are partly derived from actual feeding experiments, and are partly the result of calculation and comparison.

The percentage of the *three classes* of digestible matters, viz: *Albuminoids*,† *Carbohydrates*‡ and *Fat*, form the basis of calculating the money value of feeding stuffs. The values attached to them by Dr. Wolff are the following, the German mark being considered as equal to twenty-four cents, and the kilogram equal to 2.2 pounds avoirdupois.

1	pound	of	digestible	albuminoids	is	worth	$4\frac{1}{3}$	cents.
1	"	"	"	fat	"	"	$4\frac{1}{3}$	"
1	"	"	"	carbohydrates	"	"	$\frac{9}{10}$	"

These figures are intended to express the average *money values* of the respective food-elements in the German markets. Whether or not these values are absolutely those of our markets, they represent presumably the *relative* values of these elements, approximately, and we may provisionally employ them for the

* From "*Mentzel u. Lengerke's Kalender*," for 1879.

† The Albuminoids here include a proportion of *amides* whose quantity in feeding stuffs has very recently become a subject of investigation, and whose nutritive value is not yet fully understood.

‡ The "nitrogen free extract" (N. fr. Extract) in grains consists almost exclusively of carbohydrates, viz: starch, sugar, gum, and allied bodies; in grass and hay it includes, in addition, substances of whose properties we are ignorant but which, so far as they are *digestible*, rank with the carbohydrates.

purpose of comparing together our feeding stuffs in respect to money value.

These money or market values are to a degree independent of the feeding values. That is, if of two kinds of food, for example, Hungarian hay and malt sprouts, the one sums up a value of 66 cents, and the other a value of \$1.31 per hundred, it does not follow that the latter is worth for all purposes of feeding twice as much as the former, but it is meant that when both are properly used, one is worth twice as much money as the other. In fertilizers we estimate the nitrogen of ammonia salts at $22\frac{1}{2}$ cents per pound, and soluble phosphoric acid at $12\frac{1}{2}$ cents, but this means simply that these are equitable market prices for these articles, not that nitrogen is worth twice as much as soluble phosphoric acid for making crops. In the future more exact valuations may be obtained from an extensive review of the resources of our markets, in connection with the results of analyses of the feed and fodder consumed on our farms.

The column headed "nutritive ratio" in the table on page 78 gives the proportion of digestible albuminoids to digestible carbohydrates inclusive of fat.* The albuminoids, which are represented in animal food by the casein or curd of milk, the white of egg and lean meat, and in vegetable food by the gluten of wheat (wheat gum), and other substances quite similar to milk-casein and egg-albumin, have a different physiological significance from the carbohydrates, which are fiber or cellulose, starch, the sugars, the gums, and similarly constituted matters.

The albuminoids may easily be made over by the animal into its own substance, i. e., into muscles, tendons, and the various working tissues and membranes which are necessary parts of the animal machine, because they are the same kind of materials, are, chemically speaking, of the same composition.

The carbohydrates, on the other hand, probably cannot serve at all for building up the muscles and other parts of the growing animal, and cannot restore the waste and wear of those parts of mature animals, because they are of a very different nature. They contain no nitrogen, an element which enters into all the animal tissues (albuminoids) to the extent of some fifteen per cent. of their dry matter.

The carbohydrates cannot restore the worn out muscles or mem-

* Fat and carbohydrates have, it is believed, nearly the same nutritive function, and it is assumed that 1 part of fat equals 2.4 of carbohydrates.

branes of the animal any more than coal can be made to renew the used-up packing, bolts, valves, flues and gearing of a steam-engine. The albuminoids are to the ox or the man what brass and iron are to the machine, the materials of construction and repair.

The carbohydrates are, furthermore, to the animal very much what coal and fuel are to the steam-engine. Their consumption generates the power which runs the mechanism. Their burning (oxidation) in the blood of animals produces the results of life just as the combustion of coal in the fire-place of the steam-engine produces the motion and power of that machine.

There is, however, this difference between the engine and the animal. The former may be stopped for repairs, the latter may run at a lower rate, but if it be stopped it cannot resume work. Hence the repairs of the animal must go on simultaneously with its wastes. Therefore, the material of which it is built must admit of constant replacement, and the dust and shreds of its wear and tear must admit of escape without impeding action. The animal body is as if an engine were fed with coal and water not only, but with iron, brass and all the materials for its repair, and also is as if the engine consumed its own worn out parts, voiding them as ashes or as gas and smoke. The albuminoids, or blood- and tissue-formers, are thus consumed in the animal, as well as the carbohydrates, or fuel proper. The fact that the albuminoids admit of consumption implies that when the carbohydrates or proper fuel are insufficient, they, the albuminoids, may themselves serve as fuel. Such is the case, in fact. But, nevertheless, the two classes of substances have distinct offices in animal nutrition, and experience has demonstrated, that for each special case of animal nutrition a special ratio of digestible albuminoids to digestible carbohydrates is the best and most economical, and, within certain limits, is necessary. This proportion we designate as the *nutritive ratio*, and these explanations make its significance evident.

To allow of directly comparing the money-value of feeding stuffs with some universally accepted standard, the last column of the table (page 78) gives a comparison with good average meadow hay taken as 1.

Average Composition, Digestibility and Money Value of Feeding Stuffs as given by Dr. Wolf for Germany for 1879, except those in italics.

	Water.	Ash.	Nitrogenous Matters. Albuminoids & Amides.	Fiber.	Nitrogen-free Extract.	Fat.	Digestible nutrients.			Nutritive Ratio.*	Value.	
							Albuminoids.	Carbohydrates including fiber.	Fat.		Dollars per 100 pounds.	Comparison with meadow hay = 1.
Meadow hay, poor	14.3	5.0	7.5	33.5	38.2	1.5	3.4	34.9	0.5	10.6	0.48	0.74
" " fair	14.3	5.4	9.2	29.2	39.7	2.0	4.6	36.4	0.6	8.3	0.55	0.86
" " average	14.3	6.2	9.7	26.3	41.4	2.5	5.4	41.0	1.0	8.0	0.64	1.00
" " very good	15.0	7.0	11.7	21.9	41.6	2.8	7.4	41.7	1.3	6.1	0.74	1.17
" " extra	16.0	7.7	13.5	19.3	40.4	3.0	9.2	42.8	1.5	5.1	0.84	1.32
Clover hay, average	16.0	5.3	12.3	26.0	38.2	2.2	7.0	38.1	1.2	5.9	0.69	1.08
" " best	16.5	7.0	15.3	22.2	35.8	3.2	10.7	37.6	2.1	4.0	0.88	1.39
Timothy hay	14.3	4.5	9.7	22.7	45.8	3.0	5.8	43.4	1.4	8.1	0.69	1.09
Hungarian hay	13.4	5.7	10.8	29.4	38.5	2.2	6.1	41.0	0.9	7.1	0.66	1.04
Rye straw	14.3	4.1	3.0	44.0	33.3	1.3	0.8	36.5	0.4	46.9	0.35	0.55
Oat "	14.3	4.0	4.0	39.5	36.2	2.0	1.4	40.1	0.7	29.9	0.44	0.69
Rich pasture grass	78.5	2.2	4.5	4.0	10.1	1.0	3.4	10.9	0.6	3.6	0.27	0.42
Average meadow grass, fresh	70.0	2.1	3.4	10.1	13.4	1.0	1.9	14.2	0.5	8.1	0.22	.36
Green maize, German	85.0	1.0	1.2	4.7	7.6	0.5	0.7	7.4	0.2	11.3	.10	.16
" <i>Mr. Webb, 1874</i>	86.0	0.8	0.8	4.8	7.3	0.3	0.6	8.3	0.2	14.4	.11	.17
<i>Cured Maize Fodder, Mr. Webb</i>	27.3	4.2	4.4	25.0	37.9	1.3	3.2	43.4	1.0	14.4	.57	.91
Potatoes	75.0	0.9	2.1	1.1	20.7	0.2	2.1	21.8	0.2	10.6	.29	.46
Carrots	85.0	0.9	1.4	1.7	10.8	0.2	1.4	12.5	0.2	9.3	.18	.28
Mangolds	88.0	0.8	1.1	0.9	9.1	0.1	1.1	10.0	0.1	9.3	.14	.22
Rutabagas	87.0	1.0	1.3	1.1	9.5	0.1	1.3	10.6	0.1	8.3	.15	.24
Turnips	92.0	0.7	1.1	0.8	5.3	0.1	1.1	6.1	0.1	5.8	.11	.16
Sugar beets	81.5	0.7	1.0	1.3	15.4	0.1	1.0	16.7	0.1	17.0	.19	.30
Maize, German	14.4	1.5	10.0	5.5	62.1	6.5	8.4	60.6	4.8	8.6	1.10	1.73
" <i>American</i>	14.4	1.5	10.7	2.0	66.5	4.9	9.0	63.3	3.7	8.0	1.12	1.75
Oats	14.3	2.7	12.0	9.3	55.7	6.0	9.0	43.3	4.7	6.1	.97	1.63
Rye	14.3	1.8	11.0	3.5	67.4	2.0	9.9	65.4	1.6	7.0	1.09	1.68
Barley	14.3	2.2	10.0	7.1	63.9	2.5	8.0	58.9	1.7	7.9	0.95	1.47
Peas	14.3	2.4	22.4	6.4	52.5	2.0	20.2	54.4	1.7	2.9	1.44	2.25
Field beans	14.5	3.1	25.5	9.4	45.9	1.6	23.0	50.2	1.4	2.3	1.51	2.36
Squashes	89.1	1.0	0.6	2.7	6.5	0.1	0.4	7.1	0.1	18.4	.08	.13
Malt sprouts	10.1	7.2	24.3	14.3	42.1	2.1	19.4	45.0	1.7	2.5	1.31	2.06
Wheat bran, coarse	12.9	6.6	15.0	10.1	52.2	3.2	12.6	42.6	2.6	3.9	1.04	1.63
" fine	13.1	5.4	14.0	8.7	55.0	3.8	11.8	44.3	3.0	4.4	1.03	1.62
Middlings	11.5	3.0	13.9	4.8	63.5	3.3	10.8	54.0	2.9	5.7	1.07	1.68
Rye bran	12.5	5.2	14.5	5.7	58.6	4.5	12.2	46.2	3.6	4.5	1.10	1.72
Palm-nut cake	10.5	4.2	16.9	17.4	41.0	10.0	16.1	55.4	9.5	4.9	1.61	2.51
Cotton seed cake decorticated	11.2	7.6	38.8	9.2	19.5	13.7	31.0	18.3	12.3	1.6	2.05	3.22
<i>Scrap, by Goodale's process</i>	11.5	---	64.0	---	---	4.6	57.6	---	4.1	0.2	2.67	4.17
<i>Fish-scrap, dry ground</i>	11.7	---	51.5	---	---	8.1	46.4	---	6.2	0.3	2.28	3.56
Dried blood	12.0	4.1	80.8	---	2.6	0.5	54.1	2.6	0.5	---	2.39	3.76
Whey	92.6	0.7	1.0	---	5.1	0.6	1.0	5.1	0.6	6.6	.11	.18
Milk	87.5	0.7	3.2	---	5.0	3.6	3.2	5.0	3.6	4.4	.34	.53

* Nutritive ratios are read, 1: 10.6, 1: 8.3, etc. See page 76.

MAIZE.

- LXXIII, Maize Meal. Ground by Marsh, White & Co., N. Y.
From old western corn. One week in store. From
stock of D. B. Crittenden & Co., New Haven. Cost
\$25 per ton.
- LXXIV, Maize Meal. Fresh ground from old New York corn.
From stock of N. W. Merwin, New Haven. Cost
\$25 per ton.
- LXXVI, Maize Kernel, "High-mixed." 1879 crop. From stock
of N. W. Merwin, New Haven. Cost 65 cents per
56 lbs.
- LXXVII, Maize Kernel, new western corn. Crop 1879. From
stock of D. B. Crittenden, New Haven. Cost 65 cts.
per 56 lbs.
- LXXVIII, Maize Kernel, "High-mixed." New crop western
corn. From stock of N. W. Merwin, New Haven.
Cost 65 cts. per 56 lbs.

All the above were sampled and sent by J. J. Webb, Hamden,
Nov. 14, 1879.

- LXXIX, King Phillip Corn, 8-rowed (Flint).
LXXX, Common Yellow Corn, 8-rowed (Flint).
LXXXI, Early Scioto Corn (Dent).
LXXXII, White Flint Corn, 8-rowed.

The last four samples were received from Chas. Fairchild, Mid-
dletown, Jan. 9, 1880, and were raised in the vicinity of that
place, in 1879.

The water-content of market Corn.

The numerous analyses of Indian Corn recently made here and
elsewhere, most of which were printed in the last Report of this
Station, have been mainly performed on samples which from long
storing in heated apartments, had become much more dry than
corn commonly is when marketed. Thus Dr. Jenkins found in
summing up the results of 63 analyses of American maize, that
the amount of water ranged from 6 to 15 per cent., the average
being $10\frac{1}{2}$ per cent. In Wolff's tables the average is 14.4, in
Kühn's tables 13.7 per cent., the minimum being 7.6, the maxi-
mum 22.4 per cent. Dr. C. A. Goessmann, in reporting recently
eleven analyses made by himself and six made by Mr. S. P. Sharp-

les, gives them all 10 per cent. of water. In my first Report for 1877, analyses of three samples of corn meal were published which contained, respectively, 12.9, 20.7 and 21.7 per cent. of water. It therefore appeared important to make further examinations of corn as it is offered in the market, in order to learn the quantities of water which belong to the commercial article. In case of the samples whose analyses are herewith given, the water was determined upon the meal or kernel as it reached the Station, and before any moisture then present could be lost by drying. It is seen from the analyses that all the samples, with one exception, contain 15 or more per cent. of water. The meal made from old Western corn and that from old New York corn, as well as the corn raised in this State, that was cured until Jan. 10th, contained an average of 15.6 per cent. One of the samples of "High-mixed New Crop Western," taken Nov. 14th, had 16.4 per cent. In the two other samples examined at the same date, the water averaged 20.45 per cent. These determinations therefore go to indicate that—1, the water in maize kernel and maize meal, as these are found in market, may range from 13 to 22 per cent. 2, well-cured corn and meal contain from 15 to 17 per cent., and 3, new corn and meal are likely to contain 20 to 21 per cent. It is evidently therefore a matter of some importance in large transactions whether, at a given price, corn and corn meal be bought in a slightly or thoroughly cured state. In the two samples of corn meal examined at this Station in 1877, containing respectively 12.9 and 21.7 per cent. of water, if they were sold at the same price, say \$1.25 per hundred pounds, the purchaser would get, in the drier sort 87 lbs., and in the damper article but 78 lbs., of actual corn-meal. In the former case this dry matter would cost \$1.44, and in the latter \$1.60 per hundred pounds. Or were the drier sample worth \$1.25 per hundred, the damper one, if otherwise of equal quality, would be worth but \$1.12.

Between the samples LXXIII and LXXVI there is a calculated difference of value of 9 cents per hundred lbs., which is mostly due to the larger quantity of water in the latter.

Every farmer is of course aware that there is a difference between new and old corn in the amount of moisture they contain, but the extent of the difference is, I believe, not generally appreciated.

ANALYSES OF MAIZE.

	Maize Meal.		Kernel as sold in market.			Unshelled corn raised in Connecticut.			
	From old Western corn. LXXXIII	From old N. Y. corn. LXXIV	High mixed. LXXVI	New Western. LXXVII	High mixed new Western. LXXVIII	King Phillip. LXXIX	Common Yellow. LXXX	Early Scioto. LXXXI	White Flint. LXXXII
Water, -----	14.56	15.32	20.68	20.22	16.41	15.97	15.77	15.24	16.82
Ash, -----	1.22	1.47	1.19	1.16	1.25	1.35	1.26	1.19	1.19
Albuminoids, -----	9.12	8.63	7.83	8.54	8.57	10.31	10.00	8.31	8.94
Fiber, -----	2.16	1.83	1.65	1.67	1.76	1.37	1.47	1.59	1.32
Carbohydrates, -----	68.89	68.77	64.95	64.86	68.16	66.50	67.06	69.78	67.84
Fat, -----	4.05	3.98	3.70	3.55	3.85	4.50	4.44	3.80	3.89

COMPOSITION RECKONED ON DRY SUBSTANCE.

Ash, -----	1.43	1.74	1.50	1.45	1.50	1.60	1.49	1.51	1.43
Albuminoids, -----	10.67	10.19	9.88	10.70	10.25	12.27	11.88	9.80	10.74
Fiber, -----	2.53	2.16	2.08	2.09	2.10	1.62	1.74	1.87	1.58
Carbohydrates, -----	80.63	81.21	81.88	81.31	81.55	79.15	79.62	82.34	81.57
Fat, -----	4.74	4.70	4.66	4.45	4.45	5.36	5.27	4.48	4.68

DIGESTIBLE NUTRIENTS IN AIR-DRY SUBSTANCE.

Albuminoids, -----	7.66	7.25	6.58	7.17	7.20	8.66	8.40	6.98	7.51
Carbohydrates, -----	65.56	65.32	61.66	61.59	64.72	63.02	63.58	66.18	64.26
Fat, -----	3.20	3.14	2.92	2.80	3.04	3.56	3.51	3.00	3.07
Nutritive ratio, -----	1:9.6	1:10.0	1:10.4	1:9.5	1:10.0	1:8.3	1:8.6	1:10.5	1:8.7
Estimated value per 100 lbs. -----	\$1.06	\$1.05	\$0.97	\$0.99	\$1.03	\$1.10	\$1.09	\$1.03	\$1.04

Comparative value of the Corn-Meal and shelled Corn in market.

In the first Report of this Station, the composition of three samples of commercial maize-meal was compared with that of five varieties of unground corn, and it was remarked that the meal was considerably inferior to the corn, containing, on the average, in dry matter, one per cent. less of fiber, two per cent. less of albuminoids, and two per cent. less of fat than the unground maize. It was in order to make further comparisons between commercial meal and corn that the first five analyses above given were carried out in detail.

Comparison of averages (dry matter).

	1877.	1879.		1879.	Dr. Jenkins'	
	Commercial	Commercial		Selected	Averages	
	Meal.	Meal.	Corn.	Conn. Corn.	Flint.	Dent.
Fiber, -----	1.68	2.34	2.09	1.70	1.71	2.10
Albuminoids, .	9.75	10.43	10.28	11.17	12.13	11.81
Fat, -----	3.69	4.72	4.39	4.95	5.77	5.46

From the above table of averages we see that the specimens of corn-meal examined in 1877 were inferior to those of 1879. The commercial meal and corn of 1879 were practically the same in composition. The corn on ear of 1879 contained on the average 0.8 per cent. more albuminoids than the market shelled-corn of the same year, and 1.5 to 1.8 per cent. less than Dr. Jenkins' averages of 31 analyses of flint and 19 of Dent. On the other hand, one of the samples of Connecticut corn of 1879, viz: the early Scioto, contained but 9.8 per cent. of albuminoids and 4.48 of fat, nearly approaching in inferiority the meal of 1877. Doubtless Dr. Jenkins' averages rate maize too high for the commercial standard, because they represent well-matured, selected, sound and clean corn, while the article in the wholesale market includes whatever is merchantable, although sometimes of inferior quality, and not altogether free from cob and other impurities.

Probably our home-raised corn is generally somewhat better than the western shelled-corn, because it is cleaner and drier, and the meal in market is liable to be inferior to both, because of more moisture and impurities, and perhaps also because damaged corn can be worked into it without ready detection.

On choice of varieties.

The four samples from Mr. Fairchild were selected and sent by him with the object to ascertain which kind was most valuable to raise for feed. Mr. Fairchild gave the following data as to weight, &c.:

The bushel or 38 lbs. of ears yielded 31 lbs. corn and 7 of cob, in case of common yellow and white flint, and 30½ lbs. corn in case of King Phillip and early Scioto. One bushel of shelled early Scioto weighed 56 lbs.; one bushel of each of the others weighed 57½ lbs. The early Scioto, which here is the lowest in quality and money value, is, probably, in a favorable climate, more productive than the other varieties, and from the softness of its kernel is perhaps more easily and completely digestible, which fact offsets its less favorable composition. It is not likely that the differences above observed are constant or characteristic of the varieties: very probably they are to a good degree accidental or dependent upon special circumstances attending the growth of these samples. Evidently it would be necessary to compare the composition and the yield of these kinds of corn during several years, as raised on quite similar soils, and under the same conditions of growth throughout, in order to establish any positive superiority of one over the others.

HAY.

LXXXIII, Clover Rowen. First year after seeding. Cut Aug. 21, 1879. From C. S. Gillette, Cheshire. Mostly red clover, with small admixture of weeds and grasses.

LXXXIV, Second cut after seeding. Cut about July 1, 1879. From C. S. Gillette, Cheshire. Mixture of timothy (*Phleum pratense*) and red top (*Agrostis*). A few weeds and sedges.

	LXXXIII.	LXXXIV.	Water free.	
	LXXXIII.	LXXXIV.	LXXXIII.	LXXXIV.
Water,-----	17.40	13.12		
Ash,-----	3.89	4.11	4.70	4.73
Albuminoids,* -----	13.54	6.91	16.37	7.95
Fiber,-----	25.86	28.11	31.33	32.35
Nitrogen-free extract,-----	37.07	45.73	44.90	52.65
Fat,-----	2.24	2.02	2.70	2.32
	<hr/>	<hr/>	<hr/>	<hr/>
	100.00	100.00	100.00	100.00

* Including "amides" = 1.85 % in LXXXIII and 0.85 % in LXXXIV.

Digestible Nutrients in Air-dry Substance.

	LXXXIII.	LXXXIV.
Albuminoids, or protein,	8.12	3.59
Carbohydrates.	37.07	45.73
Fat,	1.32	0.99
Nutr. ratio,	1 : 5.0	1 : 13.4

Notes to Hay Analyses, by Dr. Armsby.

"The albuminoids of the clover hay (LXXXIII) are higher than the average of German analyses, and about equal to Wolff's 'Very good' Clover Hay. Its crude fiber is, however, relatively high, being about equal to that of Wolff's 'Average,' but lower than the average of all analyses as given by Kühn. The digestibility of protein appears to be largely determined by the percentage of crude fiber, but to be also affected by the percentage of protein. We may therefore assume the albuminoids of this sample to be rather more digestible than in Wolff's 'Average,' but less so than in his 'Very good,' estimating it at 60. For fat we may assume 59, the corresponding coefficient, without serious error. The digestible carbohydrates are represented approximately by the nitrogen-free extract of the analysis.

LXXXIV has about the composition of Wolff's 'Inferior' Meadow Hay, though it is deficient in albuminoids, and we may assume his coefficients for albuminoids and fat, viz: 52 and 49, respectively, while the nitrogen-free extract represents the digestible carbohydrates."

COTTON SEED MEAL.

LXXXV, From stock of Northam & Robinson, Hartford, Ct.
Sent by R. E. Pinney, Suffield. Price \$25.00 per ton,
in 10 ton lots.

LXXXVIII, From stock of C. H. Carrington, Naugatuck. Sent
by M. S. Baldwin, Naugatuck. \$30.00 per ton.

	LXXXV.	LXXXVIII.
Water,	8.87	8.87
Ash,	6.99	7.34
Albuminoids,	45.00	43.06
Crude Fiber,	4.65	4.83
Nitrogen-free extract,	22.89	23.73
Fat,	11.60	12.17

	Water free.	
	LXXXV.	LXXXVIII.
Ash,	7.69	8.05
Albuminoids,	49.35	47.24
Crude Fiber,	5.11	5.30
Nitrogen-free extract,	25.11	26.03
Fat,	12.74	13.37
	<hr/> 100.00	<hr/> 100.00

Digestible Nutrients in Air-dry Substance.

	LXXXV.	LXXXVIII.
Albuminoids,	33.30	31.86
Carbohydrates,	11.60	12.03
Fat,	10.56	11.07
Nutritive ratio,	1 : 1.1	1 : 1.2
Estimated value per 100 lbs.,	\$2.00	\$1.97

These samples of Cotton Seed Meal have been already reported on as Fertilizers (Nos. 394 and 402, p. 36). They agree very closely in composition. Their value, estimated by Wolff's figures, is \$40 per ton. The feeding experiments from which the digestibility of cotton seed meal was deduced, were made with a very impure and inferior Egyptian meal, and as Dr. Armsby implies in his Manual of Cattle Feeding, p. 347, it is probable that the digestibility of the pure meal is greater. If that be the fact, then the above estimated value is relatively too low.

Either as Fertilizer or as Cattle Food, cotton seed meal is one of the cheapest articles in the market, and deserves to be used to a much greater extent than it now is. By employing it first in the feeding trough, its fat and carbohydrates are utilized to the best advantage. Thence a large share of its nitrogen, its phosphates and potash pass into and enrich the manure.

WHEAT FLOUR.

LXXXVI, New Process Flour, from Minnesota Spring Wheat.
Sent by N. W. Merwin & Co.

LXXXVII, Fine Flour from entire wheat W^W_W brand.

Prepared from same kind of wheat as the preceding sample. Sent by N. W. Merwin & Co.

	LXXXVI.	LXXXVII.
Water, -----	12.79	12.89
Ash, -----	0.50	1.44
Albuminoids, -----	12.31	14.12
Crude Fiber, -----	0.07	1.22
Nitrogen-free extract, -----	73.14	68.32
Fat, -----	1.19	2.01

	LXXXVI.	LXXXVII.
Water free.		
Ash, -----	.57	1.65
Albuminoids, -----	14.12	16.20
Crude Fiber, -----	.08	1.39
Nitrogen-free extract, -----	83.86	78.46
Fat, -----	1.37	2.33
	100.00	100.00

DUST OF VEGETABLE IVORY.

LXXXIX, Refuse of button factory. Sent by M. S. Baldwin,
Naugatuck.

	LXXXIX.	Maize Cob, average.	Date Stones, average.
Water, -----	18.78	9.16	9.27
Ash, -----	1.08	1.32	1.04
Albuminoids, -----	3.37	2.22	5.46
Crude Fiber, -----	7.50	32.04	23.06
Nitrogen-free extract, -----	68.57	54.85	52.67
Fat, -----	.70	.41	8.50
	100.00	100.00	100.00

			Water free.
Ash, -----	1.33	1.45	1.15
Albuminoids, -----	4.15	2.44	6.02
Fiber, -----	9.23	35.31	25.24
Nitrogen-free extract, -----	84.43	60.35	58.05
Fat, -----	.86	.45	9.37
	100.00	100.00	100.00

Nothing, at first sight, would appear to be of less value as cattle food, than the so-called vegetable ivory, the fruit of the *Phytelephas*, a tree of South America. Mr. Baldwin writes, however, that "it has been used as feed for cattle. It is claimed that they eat it with great relish, and fatten upon it." The analysis shows it to contain 68½ per cent. of non-nitrogenous extract, which consists largely if not entirely of carbohydrates, the precise nature of

which is under investigation. The vegetable ivory resembles maize cob in composition, except that it contains, water-free, 26 cent. less fiber and 24 per cent. more carbohydrates, as well as somewhat more albuminoids and fat.

The vegetable ivory is nearly equalled in its carbohydrates by date stones, which closely resemble it in appearance, hardness and apparent worthlessness as cattle food. The date stones contain, however, 2 per cent. more albuminoids and $8\frac{1}{2}$ per cent. more fat. Date stones, the analysis of which we owe to Prof. Storer,* are, according to the testimony of travelers, made use of, in Arabia and Africa, after pounding and soaking in water, as food for camels, cows and sheep.

The vegetable ivory unquestionably cannot rank high as a cattle food, either because of its abundance or on account of its nutritive quality; it may, nevertheless, be worth economizing, where its dust or fine turnings are to be had, but should evidently be fed in conjunction with cotton seed meal, brewers' grains or other concentrated foods that can supply the albuminoids and fat, in which it is relatively deficient.

KILN-DRIED BREWERS' GRAINS.

Brewers' Grains, i. e., the residue of barley after it has been malted and used for making beer-wort, has long enjoyed a high repute as cattle food, especially for milk cows; and notwithstanding the fresh grains contain an average of 78 per cent. of water, they are much sought after by farmers living within a few miles of the breweries. During the warmer season, however, large quantities sour and spoil before they can be fed. The only plan of saving them hitherto has been by putting them into pits after the manner of ensilage. Recently it has been attempted to make them capable of indefinite preservation and of easy handling by removal of most of the water which not only constitutes three-fourths of their weight when fresh, but renders them so susceptible to damage. The sample whose analysis is herewith given has been thus prepared. This sample was brought to the Station by A. J. Ramsdell, Esq. of New Haven.

* Bulletin of the Bussey Institution, vol. I. pp. 373-7.

	Kiln-dried Brewers' grains, XCIII.	Oats, average.
Water	2.57	13.7
Ash	3.97	2.7
Albuminoids	20.38	12.0
Crude Fiber	11.79	9.0
Nitrogen-free extract	54.89	56.6
Fat	6.40	6.0
	<hr/> 100.00	<hr/> 100.00

The amount of water above found is perhaps smaller than can well be practically realized on a large scale. On exposure to air, the grains containing but $2\frac{1}{2}$ per cent. of water will no doubt gradually absorb several per cent. of moisture. With even 10 per cent. of water the dried brewers' grains will be, so far as chemical analysis can indicate, equal or superior to any grain or seed commonly used among us as food for animals. They correspond most nearly to oats in their composition, containing the same proportion of fat, a little more fiber and ash and some 8 per cent. more of the most costly and valuable food element, viz. albuminoids. Peas, beans and flax seed are the only seeds raised at the North which contain so much albuminoids. If experience shall show that the drying of brewers' grains can be carried on economically, the process will save a large amount of valuable cattle food from waste.

I understand it is claimed by some that the drying of brewers' grains seriously injures them for feeding purposes. This notion is in agreement with the idea put forward by the partisans of ensilage, some of whom assert that dried corn-fodder is greatly inferior to a corresponding quantity of the same put down as ensilage. In total absence of any exact comparative trials these claims must be regarded as entirely questionable. Without doubt dry brewers' grains may be considered equally nutritious with dry grains of any sort, that correspond to them in chemical composition.

POISONS.

LONDON PURPLE.

This cheap substitute for Paris Green has been reported to be efficacious as an insecticide. A sample sent by P. M. Augur, Esq., was found to contain 47.3 per cent. of *arsenic acid*. The complete analysis by Prof. Collier shows the arsenic acid to be united to lime. The arsenate of lime is sufficiently soluble in water and in the digestive fluids of animals to act as an effective poison. The London Purple may therefore be regarded as fairly the equivalent of Paris Green for destructive purposes.

THE WEST AVON POISON CASE.

On Sunday morning, May 2nd, 1880, eight milk cows belonging to Messrs. Edward Woodford & Son, of West Avon, first began to show loss of appetite and at night refused their customary feed of ground corn and rye. In the *Connecticut Farmer* of May 15, Mr. P. R. Day* relates that on Tuesday he saw the animals standing with arched backs, heads pressing against the fence or over the watering trough, into which they would occasionally put their noses to sip a little and let it drop from their feverish mouths. One was blind and the eyes of all were dull and sunken. There was a profuse flow of urine; the slight bowel discharge was mostly of a dysenteric character.

Among the earlier symptoms were a grunt of pain at each respiration, twisting their jaws, crunching of the teeth, afterwards convulsions, blind running against the fences, then rapid whirling from left to right in a circle, then falling to the ground, with agonizing bellowings, until death supervened. The first death occurred Wednesday afternoon, the second and third Wednesday night, the fourth Thursday morning, the fifth and sixth the same afternoon and night, the seventh Friday night, the eighth Sunday morning, one week from the first appearance of the illness. Dr. Cressy's *post mortem* showed extensive inflammation and corrosion of the mucous membrane of the digestive tract, while all other organs were healthy. The appearances indicated that the animals had swallowed some energetic poison. Portions of stomach- and bowel-tissue—the muscular coats—were brought to the Experi-

* The statement here given of the symptoms and *post mortem* appearances is condensed from Mr. Day's account.

ment Station in order to be subjected to examination for poisons. Dr. R. H. Chittenden, Instructor in Physiological Chemistry and Toxicology in the Sheffield Scientific School, made a full analysis but failed to identify any poison. In fact, so long a time had elapsed between taking poison and death and the tissues had been so denuded of the mucous membrane, that there was little hope of finding poison in them. Application was made, May 11, to Dr. Cressy to obtain, if possible, some of the feed which had been given to the cows, and shortly a small quantity of meal was received from the Messrs. Woodford. The meal bin became empty on Monday, May 3, the day after the cows became sick, and was that day replenished. The sample sent to the Station was obtained by nearly emptying the bin of the new feed and carefully gathering up what remained on the bottom and in the corners. In this sample the poison was identified without difficulty as *Oxalic Acid*. It is stated that all the animals which were fed from that bin died as described. Horses, fed on the same kind of feed, but from another box, were unaffected.

PARIS GREEN ON CORN-STALKS.

Under date of Sept. 17, Mr. D. C. Spencer of Old Saybrook wrote the Station as follows: "Last Spring I applied Paris Green, mixed with water, to my corn when it was about three to five inches high, to stay the ravages of the army worm. I desire to know whether you have analyzed any corn thus treated, or can inform me if it will now be safe to feed the corn-stalks and husks? If not, will the Station analyze a sample for me?"

Mr. Spencer was requested to forward to the Station a dozen to fifteen stalks taken from different parts of the field. The sample came in good order, well tied up in papers and secured with sacking. The stalks were run through a straw cutter, and all the dust, together with a good portion of the well-mixed cuttings, were examined by Dr. Jenkins for arsenic. No trace of this poison could be found by the processes which serve to detect $\frac{1}{500,000}$ th of a grain of white arsenic. It thus appears that the Paris Green applied to the young plants had been completely removed by the rain. It has been well established by Dr. McMurtrie that vegetation takes up into its interior no arsenic from the soil with which Paris Green has been mingled in the quantities which are used for destroying insects, a result which is fully confirmed by this examination.

WHAT BECOMES OF THE RAIN-FALL?

ITS EVAPORATION AND PERCOLATION.

Inquiry.

Professor S. W. JOHNSON:

Dear Sir—At a meeting of the Killingworth Farmers' Club last winter, the question was raised whether there was not inconsistency between the teachings of science in regard to the action of water as a distributing agent for the fertilizing elements of manure, and the practice of surface application of manures to fields long in advance of plowing.

The action of water in bringing fertilizing elements from the highway upon fields favorably situated for receiving them was referred to in illustration, and the question in substance was: If water does take up and carry wherever it goes, the valuable elements of manure, must there not be in many situations risk of very serious loss by this practice? The one upon whom it devolved to answer the question was probably not very well qualified for his task. What he said was in substance as follows:

"There is no practicable method of handling manure which does not involve some waste. It decomposes rapidly under ordinary conditions and its valuable elements are volatile or soluble or both. Water which falls upon manure in the field will certainly take up some of its valuable elements and carry them in whatever direction it goes until some stronger force releases them. Gravity will release those held simply in suspension before they get very far. Those held in solution the soil will seize upon and hold if they get within its reach. But where does the water go to? Ordinarily it goes into the soil at or very near the point where it falls. The soil of a cultivated field has many times the absorptive power that the roadbed of a highway has, and while in heavy rains and upon steep hillsides a considerable amount may run off, the percentage is less than would seem and is not ordinarily enough to occasion serious waste or to overbalance the advantages, economical and otherwise, of this method of application."

A wide difference of opinion was developed as to the proportion of rain-fall which escaped from the surface of sloping fields, and upon this point more than any other the question seemed to turn. Upon this point no one present had anything but guesses to offer and the guesses varied widely.

Now my object in writing to you is to ask if any observations have ever been made which give an answer to the question. Where, and how, does the water that falls upon the surface of a cultivated field, during the year, escape? What is its destination, and by what road does it travel? I know of course that the conditions of the question are uncertain and that no answer at once simple and exact can be given, but one that approximates to accuracy would, I think, be interesting and valuable. Should you agree with me in this opinion, I should be glad to have you tell us what is known of the matter through the columns of the *Connecticut Farmer*.

Very truly yours,

J. M. HUBBARD.

Middletown, Ct., May 17, 1880.

*Answer.**

J. M. HUBBARD, Esq.:

My Dear Sir—It is evident that the water which falls upon the soil of a cultivated field partly passes through the soil, partly remains in it, partly evaporates into the air and may partly flow off the inclined surface to a lower level.

To what extent these several modes of disposal affect the rain-fall evidently depends upon a variety of conditions. Among these conditions are the quantity, frequency and rate of rain-fall, the depth and texture of the mass of soil, the texture and state of dryness of the surface of the soil, the presence or absence of growing vegetation, the weather and climate, as they influence evaporation.

The ordinary rain-gauge affords the means of ascertaining how much rain falls on any field. The lysimeter, a rain-gauge filled with soil, first constructed about 80 years ago in England by Dr. Dalton, shows how much water percolates or passes through the soil. The difference is what evaporates from or remains in the soil. The amount of water that remains in the soil at any given moment is ascertained by the loss of weight which a sample undergoes on drying.

The first observations to which I am able to refer, giving comparisons of the rain-gauge and the lysimeter are those made by Mr. Dickinson of Herts, England, of which an account by Josiah Parkes is given in Vol. V. of the Journal of the Royal Agricultu-

* Reprinted from the *Connecticut Farmer* with additions.

ral Society of England. Mr. Dickinson made regular daily observations for eight years, from 1836 to 1843 inclusive. His lysimeter was "an open-top cylinder 12 inches in diameter, sunk vertically in the earth, level with its surface, having a false bottom perforated with holes, like a cullender, which supported three feet depth of soil within the cylinder, through which and through the cullender the excess of the rain—or the portion not evaporated—filtered to the close bottom of the vessel" where it was drawn off and measured. This lysimeter "was filled with the soil of the region, *a sandy, gravelly loam* and had constantly *grass growing on it.*"

The average total rain-fall was $26\frac{6}{10}$ inches per annum; of this $11\frac{3}{10}$ inches or $42\frac{1}{2}$ per cent. filtered through the soil so that $57\frac{1}{2}$ per cent. of the rain-fall evaporated from or remained in the soil. In so long a period, we may assume without serious error that the soil at the close of the observations contained as much water as it did at the beginning, and therefore that $57\frac{1}{2}$ per cent. of the rain-fall evaporated from the surface.

But the rain-fall and the evaporation were naturally different from one year to another. The annual rain-fall ranged from 21 to 32 inches, or 2,137 to 3,139 long tons per acre, the annual evaporation was from 43 to 67 per cent. of the rain-fall.

During the six colder months, from October to March inclusive, the average rain-fall was nearly 14 inches; the evaporation was but $3\frac{5}{10}$ inches, or $25\frac{1}{2}$ per cent., the filtration being $10\frac{3}{10}$ inches, or $74\frac{1}{2}$ per cent.

During the six warmer months, from April to September inclusive, the average rain-fall was $12\frac{6}{10}$ inches, of which the evaporation was $11\frac{7}{10}$, equal to $92\frac{9}{10}$ per cent., and the percolation $\frac{9}{10}$ inch, or $7\frac{1}{10}$ per cent. During the warmer months of 1840 and 1841 no percolation took place at all. In 1836 the summer percolation was 17 per cent. of the rather less than average rain-fall.

The results of similar observations made by Dalton (3 years), Greaves (2 years), and Lawes & Gilbert (5 years), in England, gave respectively for the annual percolation 25, 27 and 36 per cent. of the rain-fall which was 26 to 28 inches. Experiments in Switzerland by Maurice (2 years), Risler (2 years), and by Gasparin (2 years) in France, gave the percolation at 39, 20 and 30 per cent. of the rain-fall which was 26 and 28 inches, except in Risler's case where it was 41 inches.

In this country we have the observations of Dr. Sturtevant at

South Framingham, near Boston, and of Professor Stockbridge at Amherst. Dr. Sturtevant observed during two years an annual rain-fall of $43\frac{1}{2}$ inches, and an average percolation of $18\frac{6}{10}$ per cent., through a gravelly loam 25 inches deep covered with growing grass. The percolation in 1876 was $10\frac{8}{10}$ per cent., that in 1877 was $26\frac{4}{10}$ per cent. of the nearly identical rain-fall. Professor Stockbridge's observations extended from May to November inclusive, of the year 1878. They were made on a "very leachy" soil 3 feet deep, the upper 10 inches of which was a sandy loam with intermixed pebbles, underlaid for 14 inches by gravelly loam, beneath which were 14 (?) inches of stones and gravel. The surface was kept bare of all vegetation.

The rain-fall for the 7 months was 25.7 inches, the percolation was 20 per cent. During *the same period* the South Framingham lysimeter received $27\frac{6}{10}$ inches of rain and its percolation was $14\frac{7}{10}$ per cent.

While the per cent. of percolation is greater in England than in this country, the total amounts measured in inches, that penetrate the soil, are not so different in the various countries. The English results of Dickinson were $11\frac{3}{10}$ inches, of Greaves $6\frac{2}{10}$ inches, of Lawes 10 inches, the Swiss figures of Maurice were $10\frac{1}{10}$ inches, of Risler $12\frac{3}{10}$ inches, the French of Gasparin $5\frac{6}{10}$ inches, the American of Sturtevant in 1876 $5\frac{7}{10}$ inches, in 1877 $11\frac{4}{10}$ inches, and those of Stockbridge for 7 months of 1877 $5\frac{14}{10}$ inches. These figures enable us to say that the filtration of water through the lysimeter amounts to from 5 to 10 inches annually with a rain-fall of 26 to 44 inches. The heavier rain-falls are evidently compensated by greater and more rapid evaporation. Evaporation and rain-fall vary within much wider limits than percolation, which is relatively constant.

The greatest amount of percolation usually occurs during the cooler half of the year from October to March inclusive. During the warmer six months the percolation is comparatively small.

Some better idea of the amount of water that falls, percolates and evaporates, per acre, yearly, may perhaps be obtained with help of the fact that 1 inch of rain on an acre of surface, equals 27,154 U. S. gallons or 862 barrels.

Dr. Wollny of the Munich experiment Station for the study of Soils, found that the same calcareous loamy soil exposed to the same rain-fall permitted 38 per cent. of the water to filter through when the surface was bare of vegetation, while but 20 per cent.

percolated when the soil carried grass or clover, the experiment lasting from April 14 to November 18, 1874.

In another series of trials, three soils, namely sand, peat and clay were compared side by side in three conditions, viz: 1, bare of vegetation, 2 in grass, and 3 covered with a layer of horse manure $2\frac{1}{2}$ inches deep. The percolation through these soils was as follows in per cent. of the rain-fall: Bare sand 64, bare peat 44, bare clay 32; grassed, sand 14, peat 9, clay 1; mulched, sand 45, peat 39, clay 49. This experiment lasted from April 23 to October 31, 1875. It shows 1st how superior clay and peat are to sand as mechanical absorbents of water, 2d that vigorous vegetation greatly diminishes the percolation, because the plants take up and exhale large quantities of water, 3d that a *heavy mulch* makes the percolation less than it is in naked sand or peat but increases the percolation in clay.

In 1876 Dr. Wollny made a similar series of observations with sand, peat and clay, both naked and covered with horse manure to the depth of $\frac{6}{10}$ inch. Under this *light mulch* the percolation was somewhat greater, i. e. the evaporation was less than from bare soil. A coating of gravel had the same effect in lessening evaporation and increasing percolation as the mulch.

All the above observations refer to soils with a *level surface*. Some of them, viz., those of Lawes & Gilbert and of Stockbridge, refer to soils in their agricultural state of compactness, i. e. to soils not in any way loosened up below the plow-depth, the undisturbed soil having been *surrounded by* the lysimeter. In the other cases, mostly, the soil was dug away to sink the lysimeter and then filled into the cavity thus made. It being impossible to restore a disturbed sub-soil to its original compactness the observations made under conditions thus differing are not strictly comparable, although they cannot differ very widely.

Again, the very fact that a stratum of soil is undermined for collecting the water that percolates through it, decidedly affects percolation and evaporation,—usually diminishes the percolation and increases evaporation, by breaking the continuity of the porous earth which when continuous sucks down water from the surface when this is the wetter, and sucks up water from the sub-soil when that is the wetter, thus limiting the movement of the water of the soil within a narrower range than it naturally would have.

As regards the flow of water from sloping fields there are no

measurements extant to my knowledge, and it is evident that the amount of flow must vary indefinitely with the degree of slope and other circumstances. The surface of soil that has long been exposed to drought is difficult to wet, in fact, at first repels moisture, and a "cloud-burst" or sudden heavy rain may flow off in large proportion from a surface of very slight inclination, when the latter has become dust-dry. On the other hand, the water of a slow-beginning but long-continued and more abundant rain may all penetrate the well-moistened surface of a considerable slope.

A gravelly or coarse-sandy surface is always ready to take up the heaviest rainfall. A fine loam, if moist, will swallow rain rapidly, but dry dusty loam imbibes it slowly. Moist peat (swamp muck) or vegetable mold can hardly be overcharged by any rain, but snuff-dry peat, like a dry and shrunken sponge, requires considerable time to recover moisture.

These various results and considerations answer your question as satisfactorily as the facts within my reach permit.

Yours truly, .

S. W. JOHNSON.

SEED TESTS.

The Station has not been called upon by consumers to examine any seeds during 1880. That the Station might be of great service to farmers in this way there can be no doubt. It is very common to hear that a crop is lost or half lost because of the poor quality of seed.

On the other hand, some of our dealers are appealing to the Station for information as to the quality of the seeds they purchase, and I give below a summary of results mostly obtained during 1880, in making tests for the trade, with onion, lettuce, and cucumber seeds. In case of onion seeds the tests are classed according to the age of the seed, as well as its variety. Most of these seeds were grown in Connecticut. A number came from Western States, some from California. The samples of onion seed were examined immediately after their arrival at the Station.

The results confirm in a very striking manner the opinion of experienced seedsmen that seeds rapidly deteriorate in quality by keeping. They also show that seeds of the same variety and age may differ in quality by as much as 30 per cent.; this difference depending upon the circumstances of growth, curing and keeping.

In making seed-tests, it is found that a portion of the seeds germinates within a reasonable time, 10-14 days, a second portion becomes soft and dead, and thereupon moulds or decays, while a third usually small proportion remains sound. If the experiment be prolonged these sound seeds either sprout or decay. Dr. Nobbe, who has had the most extensive experience in seed-examinations advises to add to the per cent. of actually sprouted seeds of all perennial forage plants, grasses, clover, etc., one-third that of the seeds that remain sound, implying that, on the average, such a proportion of the ungerminated but sound seeds would germinate under favorable conditions. This sum-total he designates *seed capable of germination*. Most generally in case of onion seed, and other annuals, those seeds which do not germinate within 10-14 days do not germinate at all, but on prolonging the trial gradually soften and decay.

In some few instances with onion seed two years old, the seeds go on sprouting for three weeks or more. Out of twenty instances where the trial of old onion seeds has been prolonged beyond 10-12 days there has been in but four cases additional germination to the extent of 3 per cent. In one of these cases the additional germination amounted to 12 per cent. Evidently the onion seeds which sprout after 10-14 days are of no practical use, as the thinning and weeding processes interfere with their growth. In our Reports, we shall give the per cent. of seed actually sprouted, and in case of perennials, shall add to it one-third of those remaining sound, to obtain the per cent. of "*seed capable of germination*" in the sense advised by Dr. Nobbe.

RESULTS OF SEED TESTS.

BY DR. E. H. JENKINS.

Variety.	Station No.	Seed sprouted (per cent.)	Seed remained sound (per cent.)	Seed rotted (per cent.)	½ sprouted seed germin- ated in days.	1,000 seeds weigh (grammes.)
<i>Cucumber Seed.</i>						
	62	37.5	0.0	62.5	4	25.95
	63	6.0	0.0	94.0	8	27.99
	64	84.5	0.0	15.5	4	27.49

No. 62 represents the cucumber seed as it came in bulk. Part of the seed appeared good, another part had apparently begun to sprout before it was prepared for market. No. 63 represents the damaged portion. No. 64 that which was apparently undamaged.

Variety.	Station No.	Seed sprouted (per cent.)	Seed remained sound (per cent.)	Seed rotted (per cent.)	$\frac{1}{2}$ sprouted seed germin- ated in days.	1,000 seeds weigh (grammes.)
<i>Onion Seed less than 1 year old.</i>						
Wethersfield	{ 85	74.0	13.0	13.0	4	----
Large Red, -----	86	80.0	3.0	17.0	7	----
	117	89.5	1.0	9.5	less than 7	2.89
	126	88.0	6.0	6.0	5	4.17
Average, -----		82.9	5.8	11.3	5	3.53
	{ 69	86.8	3.5	9.7	3	4.13
	97	98.0	1.5	0.5	6	----
	98	90.8	5.0	4.2	4	----
	101	92.2	5.5	2.3	4	----
	102	80.3	7.5	12.2	4	----
	109	85.2	8.5	6.3	4	----
Danvers Yellow, --	110	97.8	1.5	0.7	4	----
	118	88.5	1.0	0.5	less than 7	2.66
	133	91.3	4.0	4.7	5	----
	134	92.2	4.0	3.8	5	----
	135	87.3	9.0	3.7	5	----
	136	88.5	6.5	2.0	4	----
	55	64.8	11.0	24.2	7	3.59
	58	94.3	2.0	3.7	4	4.05
Average, -----		88.4	5.0	6.6	4 $\frac{1}{2}$	3.60
Extra Early Red, ----	80	82.5	12.0	5.5	4	----
	{ 114	91.8	2.5	5.7	4	----
White Portugal, ----	115	88.0	7.0	5.0	6	----
	116	89.0	5.5	5.5	4	----
	65	95.2	1.0	3.8	6	3.63
Average, -----		91.0	4.0	5.0	5	----
	{ 113	93.8	2.0	4.2	4	----
White Globe, -----	129	89.7	7.0	3.3	4	----
	57	96.0	0.5	3.5	3	3.83
Average, -----		93.2	3.2	3.6	4	----
Yell'w Gl'be Danvers, 127		88.5	6.0	5.5	5	3.76
Early Red Globe, ----	84	85.8	7.5	6.7	4	----
Red Globe, -----	128	86.0	8.5	5.5	6	4.31
	{ 131	75.3	18.5	6.2	4	----
Large Red, -----	132	85.3	5.3	9.4	4	----
	53	82.3	9.0	8.7	3	3.95
Average, -----		80.9	10.9	8.2	4	----
Yellow Dutch, -----	111	80.0	5.0	15.0	4	----
Average of all varieties, --		87.2	5.8	7.0	4	3.73

Onion Seed between 1 and 2 years old.

	{ 70	60.5	31.5	8.0	5	3.40
Danvers Yellow, --	99	41.8	42.2	16.0	6	----
	100	41.3	35.5	23.2	6	----
	54	55.7	18.0	26.3	7	3.34
Average, -----		49.8	31.8	18.4	6	3.37
White Portugal, ----	130	64.5	27.5	8.0	7	----
White Globe, -----	56	85.2	7.0	7.8	4	3.62
Red Globe, -----	112	90.5	5.0	4.5	4	----

Variety.	Station No.	Seed sprouted (per cent.)	Seed remained sound (per cent.)	Seed rotted (per cent.)	$\frac{1}{4}$ sprouted seed germin- ated in days.	1,000 seeds weigh (grammes.)
Extra Early Red, ----	59	64.5	23.5	12.0	4	3.86
Large Red, -----	52	72.3	18.5	9.2	4	3.73
Average of all varieties, -		64.0	23.0	12.8	5.2	3.59

Onion Seed between 2 and 3 years old.

Wethersfield Large Red, -----	{ 87	22.0	65.0	13.0	6	----
	88	27.5	64.0	8.5	6	----
	{ 90	18.8	42.5	38.7	6	----
	91	66.2	30.5	3.3	6	----
	{ 96	17.0	56.5	26.5	6	----
Average, -----		30.3	51.7	12.0	6	----
Danvers Yellow, --	{ 71	47.3	48.5	4.2	6	3.51
	{ 106	32.7	57.0	10.3	6	----
	Average, -----	40.0	52.7	7.3	6	----
Average of all varieties, -		33.0	52.0	15.0	6	----

Onion Seed between 3 and 4 years.

Wethersfield Large R., 51		28.0	?	?	7	3.83
Danvers Yellow, --	{ 103	1.7	82.5	15.8	10	----
	{ 104	1.8	75.5	12.7	10	----
	{ 107	2.7	32.5	64.8	6	----
	Average, -----	2.1	53.5	34.4	9	----
Extra Early Flat Red, 81		1.8	82.5	15.7	10	----
Average of all varieties, -		7.2	68.3	24.5	8.5	----

Onion Seed between 4 and 5 years.

Wethersfield Large Red, -----	{ 92	0.3	95.5	4.2	10	----
	93	0.5	88.0	11.5	10	----
	{ 94	0.5	91.0	8.5	3	----
	{ 95	0.3	87.5	12.2	10	----
Average, -----		0.4	90.5	9.1	8	----
Danvers Yellow, ----	108	0.3	93.0	6.7	10	----
Ex. Early Flat Red, {	82	2.0	78.0	20.0	10	----
	83	0.8	84.0	15.2	3	----
	Average, -----	1.0	85.0	14.0	8	----
Average of all varieties, -		0.7	88.1	11.2	8	----

Onion Seed between 5 and 6 years.

Danvers Yellow, ----	105	0.0	92.0	8.0	-	----
----------------------	-----	-----	------	-----	---	------

Lettuce Seed.

	119	96.0	0.0	4.0	3	1.31
	120	98.5	0.0	1.5	3	1.10
	122	96.0	2.0	2.0	3	1.00
	123	97.3	2.0	0.7	3	1.43
	124	98.3	1.5	0.2	3	1.36
Average, -----		97.2	1.1	1.7	3	1.24

The Station's Instructions for sampling seeds, are as follows :

THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION,
NEW HAVEN, CONN.

Instructions for Sampling Seeds.

The Agricultural value of seeds intended for Farm and Garden use is learned by examining a small average sample. A weighed amount of seed is taken, the pure seeds are culled out and weighed, foreign matters and especially noxious seeds are identified, the vitality of the pure seed is tested by careful sprouting trials and a report is drawn up of the results.

As the test of germinating power requires some time for its completion, a report on samples sent in cannot be ordinarily expected in less than two weeks.

The examination of *grass-mixtures* can only be undertaken in special cases. It requires a large outlay of time and labor which is not often justified by the results.

In selecting a sample for examination the greatest care should be used to have it represent accurately the whole amount from which it was taken.

1. Mix well together with the hand and arm the contents of the package (bag or barrel) or packages of seed.

2. Take out five or six small handfuls or cupfuls* from various parts of the package, mix these together and take a part of this mixture for the sample.

3. Send of the smaller seeds—red top, white clover, timothy, etc., two (2) ounces; of beets, turnips, red clover, etc., four (4) ounces; of wheat and cereals, and of peas and other legumes, eight (8) ounces.

4. Samples may be sent by mail, or otherwise, prepaid, and should be *plainly labeled* and addressed to

CONN. AGRICULTURAL EXPERIMENT STATION,
New Haven, Conn.

* (A small cup may be closed with the palm of the hand, forced down to the desired place, then filled and withdrawn).

Seeds sent in for gratuitous examination must be described on the subjoined Form.

THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION,
NEW HAVEN, CONN.

Form for Description of Sample.

STATION NO. REC'D AT STATION. 188 .

Each sample of Seed sent for gratuitous examination must be accompanied by one of these forms, with the blanks *below* filled out as fully as practicable.

The filled out Form, if sent with the sample, will serve as a label; but it must be returned in good order for filing in the Station Records.

Send with each sample a specimen of any printed circular, or statement that accompanies the seed or is used in its sale.

Name or label of seed,

Name and address of Producer or Importer,

Name and address of Dealer from whose stock this sample is taken,
.....

Date of taking this Sample,

Selling price per pound or bushel,

Known or reputed age of seed,

Number of packages from which sample is taken,

Quantity of stock which the sample represents,

Was sample taken according to Station Instructions, or how?
.....

Signature and P. O. address of person taking and sending the sample.
.....
.....

The results of the examinations are entered in a suitable record book, and are also reported to the parties sending, on forms of which the following is an example.

Report of Seed Test.

THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION, NEW
HAVEN, CONN., 188 .

Examination of seed.

Station No. Sender's Mark. Rec'd. 188 .

From

Pure seed, per cent. by weight.

Impurities, per cent. by weight.

Pure seed sprouted during days. per cent. by number.

Pure seed decayed during days. per cent. by number.

Pure seed sound (unsprouted) after ... days. per cent. by number.

Of sprouted seed, $\frac{1}{2}$ germinated in ... days.

1000 seeds weighed grams.

Per cent. value,

The "per cent. value" of a sample of seed is obtained by multiplying its per cent. (by weight) of pure seed into the per cent. (by number) found, or able, to germinate, and dividing by 100. It refers the number of seeds found, or able, to germinate, from "pure seed" back upon the sample itself, in terms of per cent. In case of *perennials only* it takes account of $\frac{1}{3}$ of the unsprouted sound seeds.

THE DETERMINATION OF PHOSPHORIC ACID IN COMMERCIAL FERTILIZERS.

In the second Report of this Station a volumetric method for the determination of phosphoric acid was described, which, in a number of trials, gave very satisfactory results. Further investigation showed, however, that this method could not be relied upon, because the changes of color which serve to indicate the completion of the reaction are rendered gradual and uncertain by the presence of considerable quantities of either salts of phosphoric or tartaric acid.

Our attention was then turned to the direct precipitation of magnesium-ammonium phosphate in citric solution and in presence of iron, alumina and lime. By an extensive series of trials Mr. Wells found that very good analyses could be made by this method, and he had already learned how to apply it to all the classes of fertilizers that the Station is called upon to analyze, and, together with Dr. Jenkins and Dr. Armsby, had made numerous comparative trials by it and the molybdic method, when we learned from the foreign journals that Dr. Petermann, Director of the Experiment Station at Gembloux in Belgium, had anticipated us.

The method is in our opinion quite accurate enough for the analysis of fertilizers, and is now regularly employed for that purpose in the Station, since its use saves much time and labor.

We owe to Warington * the first employment of citric acid to prevent precipitation of Fe and Al. Spiller † first showed that Ca is also held in solution by ammonium citrate. Brassier ‡ first applied this fact to phosphoric acid estimation, but held that sulphuric acid must be separated in order to get entirely satisfactory results.

Joulie § considered the sources of error in Brassier's method and claimed to have overcome them by use of a solution of magnesium citrate with citric acid. Evidently, however, his plan was a failure.

Ville § had previously described a method based upon Brassier's, but from his own account it was not satisfactory.

* Jour. Chem. Soc. London, 1863, 304.

§ Chem. News, xxvii, 228.

† Jour. Chem. Soc. London, 1858, 112.

§ Compt. Rend., lxxv, 344.

‡ Ann. de Chim. et de Phys. [4], vii, 355.

Petermann,* first brought the process into a satisfactory form, but gave no sufficient details of the mode of working.

Brunner† has given a brief account of his experience with the method, which he considers to be satisfactory for technical purposes.

Grupe and Tollens‡ have also published some preliminary studies of the process.

Mr. Wells' experiments were concluded before the two last-named papers were published, and before Petermann's paper was received at the Station. Here follows Mr. Wells' account of his work.

On Determination of Phosphoric Acid in Citric Solution.

BY H. L. WELLS, PH.B.

This investigation covers the following points:—

1. In the precipitation of NH_4MgPO_4 as ordinarily practiced, does NH_4Cl have a solvent action on the precipitate?
2. To what extent does ammonium citrate in solution dissolve NH_4MgPO_4 ?
3. When ammonium citrate is present, is magnesium citrate thrown down with NH_4MgPO_4 in such quantity as to make it necessary to dissolve and reprecipitate.
4. What effect has CaSO_4 in solutions in which NH_4MgPO_4 is precipitated in the presence of ammonium citrate?
5. What effect has CaCl_2 in the same case?
6. What effect have ferric salts?
7. What effect have aluminum salts?
8. After deciding on these points and shaping the method accordingly, practical trials were made controlling the determinations by the molybdic method.

In each experiment a measured quantity of a slightly acid solution of Na_2HPO_4 was used whose content of P_2O_5 was determined by precipitating with magnesia mixture and weighing the magnesium pyrophosphate. To this solution was added the quantities of magnesia mixture,§ ammonium citrate and other solutions required and finally an amount of ammonia solution (sp. gr. 0.96) equal to one-third of the previous volume of the liquid. The whole was stirred vigorously several times at intervals of half an

* Versuchs-Stationen, xxiv, 327.

‡ Ber. d. Deuts. Ch. Ges. XIII, 1269.

† Fres. Zeitschr., 1880, p. 142.

§ See note on p. 115.

hour, more or less, allowed to stand twelve hours, filtered on asbestos, ignited and weighed in Gooch's crucibles.

Three different solutions of sodium phosphate were used in these experiments, viz :

100 c.c. of solution I, used in experiments 1-8, precipitated with magnesia mixture gave the following amounts of magnesium pyrophosphate :

<i>a</i>	.3151 grams.
<i>b</i>	.3145 grams.
Average	.3148 grams.

100 c.c. of solution II, used in experiments A-II and 9-85, precipitated in a small volume of solution gave :

<i>a</i>	.2708 grams.
<i>b</i>	.2714 grams.
Average	.2711 grams.

100 c.c. of solution III, used in experiments 86-140 gave :

<i>a</i>	.3037 grams.
<i>b</i>	.3041 grams.
<i>c</i>	.3034 grams.
<i>d</i>	.3041 grams.
Average	.3038 grams.

100 c.c. of solution III, precipitated and filtered, the precipitate dissolved in hydrochloric acid and reprecipitated with the addition of a very little Mg. mixture gave

<i>a</i>	.3034 grams.
<i>b</i>	.3021 grams.
<i>c</i>	.3024 grams.
<i>d</i>	.3031 grams.
Average	.3028 grams.

These results show an average variation of .00035 grams from the mean of all the determinations, or .0007 between the highest and lowest and an extreme variation of .0013 between the highest and lowest. The error of experiment amounts to from one-tenth to four-tenths of one per cent. of the total amount of pyrophosphate.

1. In the ordinary mode of precipitating NH_4MgPO_4 does NH_4Cl have a solvent action on the precipitate ?

The results obtained were as follows :

	Magnesia Mixture.	NH_4Cl (total.)	Total volume.	Weight of $\text{Mg}_2\text{P}_2\text{O}_7$.	Per cent.
A	20 cm. ³	1.4 grm.	160 cm. ³ .	.2761 grm.	101.7
B	20	2.8	160	.2702	99.6
C	20	3.9	185	.2709	99.9
D	20	5.3	185	.2704	99.7
E	20	6.4	215	.2703	99.7
F	20	7.8	215	.2700	99.5
G	20	13.9	295	.2701	99.6
H	20	13.9	430	.2703	99.7

A. contained no more ammonium chloride than was present in the magnesia mixture used. The precipitate probably contained magnesium hydrate. Experience has shown that it is necessary to have more ammonia salts present than the magnesia mixture itself contains in order to secure accurate results.

In the other trials the largest error was .5 per cent. of the total amount of phos. acid, showing that the amount of NH_4Cl and the volume of the solution may vary considerably without greatly affecting the result.

2. To what extent does ammonium citrate in solution dissolve NH_4MgPO_4 ?

In these experiments the precipitated NH_4MgPO_4 was dissolved on the filter in hydrochloric acid, a few drops of Mg. mixture were added and the solution reprecipitated with NH_3 . This was done to remove any magnesium citrate which might have come down in the first precipitation.

Following are the results obtained—

No.	Magn. mix.	Citric acid.	Vol.	$\text{Mg}_2\text{P}_2\text{O}_7$ found.	$\text{Mg}_2\text{P}_2\text{O}_7$ required.	Difference grams.	Per cent.
46	15 cm ³ .	15 gm.	400 cm ³ .	.2668 gm.	.2711 gm.	— .0035 gm.	98.4
47	20	15	400	.2668	.2711	— .0035	98.4
48	40	15	400	.2670	.2711	— .0033	98.5
49	80	15	400	.2680	.2711	— .0023	98.9
50	100	15	400	.2685	.2711	— .0018	99.0
98	20	0	250	.3034	.3028	+ .0006	100.2
99	20	0	250	.3027	.3028	— .0001	99.9
100	20	1	250	.3033	.3028	+ .0005	100.2
101	20	2	250	.3033	.3028	+ .0005	100.2
102	20	5	250	.3029	.3028	+ .0001	100.0
103	20	10	250	.3024	.3028	— .0004	99.8
104	20	15	250	.3013	.3028	— .0015	99.5
105	20	20	250	.2980	.3028	— .0048	98.4
106	20	23	250	.2974	.3028	— .0054	98.2
107	20	23	250	.2981	.3028	— .0047	98.4
108	20	23	250*	.3002	.3028	— .0024	99.1
109	20	23	250*	.3019	.3028	— .0009	99.7
110	20	23	500	.3000	.3028	— .0028	99.0
111	20	23	500	.2994	.3028	— .0034	98.5
112	20	23	500	.3013	.3028	— .0015	99.5

* Double the usual amount of ammonia.

Experiments 46–50 show that the presence of 15 grams of citric acid may make the result come considerably too low, but that this tendency is counteracted somewhat by a large amount of magnesia mixture. Experiments 104 and 112 are exceptional.

Experiments 100–107, 110 and 111 show that amounts of citric acid less than 15 grams in 250–500 c.c. of solution have only a very slight solvent action, while larger quantities have consider-

able effect. 108 and 109 show that this solvent action is almost wholly counteracted by using a larger amount of ammonia.

3. In the presence of ammonium citrate is magnesium citrate thrown down with NH_4MgPO_4 in such quantity as to make it necessary to dissolve and reprecipitate?

In these experiments the precipitate was not dissolved, but was weighed directly.

In the following table the results are arranged according to the amount of citric acid employed. An asterisk signifies that double the usual quantity of ammonia was used.

No.	Magn. mix.	Citric acid.	Vol.	Found.	Required.	Difference.	Per cent.
15	20 cm ³ .	1 gm.	163 cm ³ .	.2723 gm.	.2711 gm.	+.0012 gm.	100.5
35	2	1	140	.0262	.0271	-.0009	96.7
36	20	1	164	.0273	.0271	+.0002	100.8
16	20	2	166	.2715	.2711	+.0004	100.2
17	20	2	166	.2719	.2711	+.0008	100.3
34	20	2	400	.2712	.2711	+.0001	100.0
37	20	2	200	.0276	.0271	+.0005	101.8
33	20	3	400	.2702	.2711	-.0009	99.7
18	20	5	315	.2699	.2711	-.0012	99.5
29	80	5	260	.2762	.2711	+.0051	101.8
30	80	5	400	.2778	.2711	+.0067	102.4
31	20	5	180	.2688	.2711	-.0023	99.1
32	20	5	400	.2689	.2711	-.0022	99.1
38	10	5	276	.0274	.0271	+.0003	100.9
39	20	5	400	.0271	.0271	+.0000	100.0
44	80	5	400	.0278	.0271	+.0007	102.6
113	20	7	350*	.3045	.3028	+.0017	100.6
6	20	10	—?	.3151	.3148	+.0003	100.1
19	20	10	200	.2672	.2711	-.0039	98.6
20	20	10	400	.2677	.2711	-.0037	98.8
23	80	10	400	.2725	.2711	+.0014	100.5
27	20	10	300*	.2679	.2711	-.0032	98.9
40	20	10	400	.0274	.0271	+.0003	101.1
41	20	10	400	.0270	.0271	-.0001	99.6
114	20	10	350*	.3023	.3028	-.0005	99.8
7	20	15	---	.3110	.3148	-.0038	98.7
21	20	15	565	.2658	.2711	-.0053	98.0
22	20	15	420	.2664	.2711	-.0047	98.2
24	80	15	400	.2718	.2711	+.0007	100.2
25	20	15	220	.2665	.2711	-.0046	98.3
26	20	15	625	.2677	.2711	-.0034	98.8
28	20	15	330*	.2672	.2711	-.0039	98.6
42	20	15	400	.0268	.0271	-.0003	98.9
43	20	15	400	.0267	.0271	-.0004	98.5
45	80	15	400	.0280	.0271	+.0009	103.3
46	15	15	400	.2668	.2711	-.0043	98.4
47	20	15	400	.2668	.2711	-.0043	98.4
48	40	15	400	.2670	.2711	-.0041	98.5
49	80	15	400	.2680	.2711	-.0031	98.8
50	100	15	400	.2685	.2711	-.0026	99.0
115	20	15	350*	.3006	.3028	-.0022	99.2
116	20	23	350*	.2985	.3028	-.0043	98.5

The experiments in which 7 grams or less of citric acid were used show that such an amount does not seriously affect the accuracy of the result. The two errors already noticed, viz: the precipitation of magnesium citrate and the solution of NH_4MgPO_4 in ammonium citrate very nearly offset each other. Throwing out Nos. 35, 36, 37, 29, 30, 38, 39, and 44, the averages are with 1 gram $\overline{\text{Ci}}$ 100.5 per cent.; with 2 grams 100.3 per cent.; with 3 grams 99.7 per cent.; with 5 grams 99.2 per cent.; with 7 grams (where double the usual volume was employed) 100.6 per cent. Nos. 29, 30 and 44 are not comparable on account of the very large amount of magnesia mixture used. Nos. 35, 36, 37, 38 and 39 contained very small amounts of P_2O_5 . The absolute error is small, in these cases, excepting perhaps 35 (where little magnesia mixture was used), quite within the unavoidable errors of experiment, but the percentage error is larger.

Nos. 29, 30 and 44 indicate that with 5 grams of citric acid a very large excess of magnesia mixture (80 c.c.) introduces serious error.

20 c.c. of magnesia mixture is sufficient to precipitate .4 grams P_2O_5 , so that in all cases more than twice as much magnesia mixture was used as was absolutely necessary.

Below are tabulated the results of experiments where 10 grams of citric acid were used, arranged according to the volume of solution.

No.	Magn. mixture.	Volume.	Per cent.
19	20 cm ³ .	200 cm ³ .	98.6
27	20	300*	98.9
114	20	350*	99.8
20	20	400	98.8
40	20	400	101.1†
41	20	400	99.6†
23	80	400	100.5
6	20	?	100.1

Below are tabulated those experiments where 15 grams of $\overline{\text{Ci}}$ were used, arranged according to the volume of solution.

No.	Magn. mix.	Volume.	Per cent.	No.	Magn. mix.	Volume.	Per cent.
25	20 cm ³ .	220 cm ³ .	98.3	50	100 cm ³ .	400 cm ³ .	99.0
28	20	330*	98.6	42	20	400	98.9†
115	20	350*	99.2	43	20	400	98.5†
46	15	400	98.4	45	80	400	103.2†
47	20	400	98.4	22	20	420	98.2
48	40	400	98.5	21	20	565	98.0
24	80	400	100.2	26	20	625	98.8
49	80	400	98.8				

* Double the usual amount of ammonia.

† In these experiments the small amount of P_2O_5 used exaggerates the per cent. error or difference ten times as compared with the others.

These figures indicate that with 15 grams or more of citric acid in solution, the results will be more than 1 per cent. too low unless there is some compensation. A very large excess of magnesia mixture will tend to lessen this error.

Dilution and a larger amount of ammonia also appear to tend in the same direction, but in respect to their influence the results are unsatisfactory.

It will be noticed that the absolute error is much smaller and the percentage error is no larger in those cases where the total amount of P_2O_5 is smaller.

A comparison of these results with those under 2 indicates that nothing is gained by dissolving and reprecipitating the $MgNH_4PO_4$.

4. What effect has $CaSO_4$ in solutions in which NH_4MgPO_4 is precipitated in the presence of ammonium citrate?

The details of the experiments on this point are given below.

No.	Mag. mix. cm ³ .	Citric acid. gram.	$CaSO_4$ + $2H_2O$ gram.	Vol. cm ³ .	$Mg_2P_2O_7$ found. gram.	$Mg_2P_2O_7$ required. gram.	Difference ($Mg_2P_2O_7$.) gram.	Am- monia.	Per cent.
51	20	2	.5	240	.2803	.2711	+ .0092	$\frac{1}{4}$ dil.	103.4
52	20	3	.5	240	.2740	.2711	+ .0029	"	101.0
53	20	2	.5	400	.2745	.2711	+ .0036	"	101.2
54	20	3	.5	400	.2746	.2711	+ .0037	"	101.2
55	20	5	.5	400	.2734	.2711	+ .0023	"	100.8
56	20	2	.5	230	.0296	.0271	+ .0025	"	109.2
57	20	3	.5	230	.0286	.0271	+ .0015	"	105.5
58	20	5	.5	230	.0276	.0271	+ .0005	"	101.8
59	20	5	.5	400	.0282	.0271	+ .0011	"	103.9
60	20	5	.5	400	.2728	.2711	+ .0017	"	100.6
61	20	7	.5	400	.2728	.2711	+ .0017	"	100.6
62	20	10	.5	400	.2718	.2711	+ .0007	"	100.3
63	20	15	.5	400	.2709	.2711	-.0002	"	99.9
64	20	5	.5	400	.0278	.0271	+ .0007	"	102.5
65	20	7	.5	400	.0275	.0271	+ .0004	"	101.4
66	20	10	.5	400	.0269	.0271	-.0002	"	99.3
67	20	15	.5	400	.0270	.0271	-.0001	"	99.6
72	20	5	.5	180	.2736	.2711	+ .0025	"	100.9
73	20	15	.5	235	.2701	.2711	-.0010	"	99.6
117	20	7	.25	350	.3060	.3028	+ .0032	$\frac{1}{4}$ conc.	101.0
118	20	10	.25	350	.3052	.3028	+ .0024	"	100.8
119	20	15	.25	350	.3040	.3028	+ .0012	"	100.4
120	20	23	.25	350	.3020	.3028	-.0008	"	99.7
121	20	7	1	350	.3093	.3028	+ .0065	"	102.1
122	20	10	1	350	.3085	.3028	+ .0057	"	101.2
123	20	15	1	350	.3053	.3028	+ .0025	"	100.8
124	20	23	1	350	.3041	.3028	+ .0013	"	100.4

The results in general are high: in all cases where less than 5 grams of citric acid was used with .5 gram $CaSO_4 + 2H_2O$ they are 1 per cent. or more too high. Where 5 or more grams of Ca were

employed they were in all cases satisfactory except in 117, 121 and 122, where double the usual quantity of ammonia was employed.

5. What effect has calcium chloride on the precipitation of NH_4MgPO_4 in the presence of Ci ?

The details of the experiments made are given in the following table.

The same results essentially were obtained as with $\text{CaSO}_4 + 2\text{H}_2\text{O}$, that is: the presence of calcium chloride tends to make the results too high. With more than 10 grams of Ci the error was less than 1 per cent. when quantities of calc. chloride were present equivalent to from .25-1.0 grams of calc. sulphate.

No.	Mg. mix. cm ³ .	CaCl ₂ . gram.	Citric acid. gram.	Vol. cm ³ .	Mg ₂ P ₂ O ₇ . found. gram.	Mg ₂ P ₂ O ₇ . required. gram.	Difference. gram.	Am- monia.	Per cent.
125	20	.15*	7	350	.3078	.3028	+.0050	$\frac{1}{2}$ conc.	101.6
126	20	.15*	10	350	.3062	.3028	+.0034	"	101.1
127	20	.15*	15	350	.3054	.3028	+.0026	"	100.8
128	20	.15*	23	350	.3028	.3028	.0000	"	100.0
129	20	.6†	7	350	.3106	.3028	+.0078	"	102.6
130	20	.6†	10	350	.3078	.3028	+.0050	"	101.6
131	20	.6†	15	350	.3058	.3028	+.0030	"	100.7
132	20	.6†	23	350	.3032	.3028	+.0004	"	100.1
133	20	.15*	7	350	.0306	.0303	+.0003	"	100.9
134	20	.15*	10	350	.0305	.0303	+.0002	"	100.6
135	20	.15*	15	350	.0308	.0303	+.0005	"	101.6
136	20	.15*	23	350	.0296	.0303	-.0007	"	97.6
137	20	.6†	7	350	.0317	.0303	+.0014	"	104.2
138	20	.6†	10	350	.0313	.0303	+.0010	"	103.2
139	20	.6†	15	350	.0305	.0303	+.0002	"	100.6
140	20	.6†	23	350	.0294	.0303	-.0009	"	97.0

* Equivalent to .25 gr. $\text{CaSO}_4 + 2\text{H}_2\text{O}$.

† Equivalent to 1 gr. $\text{CaSO}_4 + 2\text{H}_2\text{O}$.

With large or small amounts of phosphoric acid the results are equally satisfactory.

6. What effect on the precipitation have sesqui-salts of iron?

Following are the details of the experiments—

No.	Mg. mix.	Ci .	Fe_2O_3 .	Vol.	Mg ₂ P ₂ O ₇ . found.	Mg ₂ P ₂ O ₇ . required.	Diff.	Per cent.
10	20 cm ³ .	5 gm.	.5 gm.	? cm ³ .	.2756 gm.	.2711 gm.	+.0045 gm.	101.6
12	20	8	.5	?	.2705	.2711	-.0006	99.8
68	20	5	.5	228	.0284	.0271	+.0013	104.8
69	20	7	.5	400	.0283	.0271	+.0012	104.4
70	20	10	.5	400	.0280	.0271	+.0009	103.3
71	20	15	.5	400	.0270	.0271	-.0001	99.6
74	20	5	.5	400	.2705	.2711	-.0006	99.7
75	20	7	.5	400	.2732	.2711	+.0021	100.7
76	20	10	.5	400	.2710	.2711	-.0001	99.9
77	20	15	.5	400	.2689	.2711	-.0022	99.1

In 10, 68 and 74 the $\bar{\text{Ci}}$ present was insufficient to produce a greenish yellow color; the solutions were red and the precipitates contained iron. In three cases where a small amount of phosphoric acid was present, the results came much too high, and the absolute error was rather too large to be considered due to the errors of experiment. The error decreased as the amount of citric acid increased, and in 71 with 15 grams of $\bar{\text{Ci}}$ the result was satisfactory.

With a larger quantity of P_2O_5 the results came within 1 per cent of the actual amount, with the exception of 10, where 5 grams $\bar{\text{Ci}}$ were used.

7. What effect on the precipitation has the presence of salts of aluminum? Following are the results—

No.	Mg. mix.	$\bar{\text{Ci}}$.	Al_2O_3 .	Vol.	$\text{Mg}_2\text{P}_2\text{O}_7$ found.	$\text{Mg}_2\text{P}_2\text{O}_7$ required.	Diff.	Per cent.
9	20 cm ³ .	5 gm.	.5 gm.	? cm ³ .	.2602 gm.	.2711 gm.	— .0109 gm.	96.0
11	20	8	.5	?	.2681	.2711	— .0030	98.9
13	20	11	.5	?	.2680	.2711	— .0031	98.8
78	20	5	.5	400	.2699	.2711	— .0012	99.5
79	20	7	.5	400	.2702	.2711	— .0009	99.7
80	20	10	.5	400	.2700	.2711	— .0011	99.6
81	20	15	.5	400	.2674	.2711	— .0037	98.6
82	20	7	.5	400	.0275	.0271	+ .0006	101.4
83	20	10	.5	400	.0262	.0271	— .0009	96.7
84	20	15	.5	400	.0258	.0271	— .0013	95.2

In general the presence of aluminum salts depresses the results. With .5 grms. Al_2O_3 , 5–15 grms. $\bar{\text{Ci}}$, 20 c. c. magnesia mixture, and 400 c. c. total volume of solution, the error falls within 1 per cent.

Summary.

The conditions which tend to introduce a plus error are these:

1. Excessive amount of magnesia mixture in the presence of $\bar{\text{Ci}}$.

2. Presence of calcium as sulphate or chloride.

3. Presence of ferric salts.

The circumstances which tend to make a minus error are:

1. Solvent action of ammonium citrate on MgNH_4PO_4 .

2. Presence of aluminum salts in the solution.

The most serious error is likely to come from the solvent action of ammonium citrate, and it is to be avoided by increasing the amount of magnesia mixture as the amount of citrate increases, by moderate dilution, and when the amount of citrate is very

large (23 grams as in the case of reverted P_2O_5 — estimations) by increasing the amount of ammonia employed.

The following quantities of reagents were used in the subjoined analyses of commercial fertilizers.

In case of superphosphates, the analysis by the citric method has sometimes been made on a single portion of 2 grams, which was first washed on a filter with water to extract soluble P_2O_5 , then digested with ammonium citrate, as directed by Fresenius, Neubauer and Luck, and "reverted" P_2O_5 thrown down from the solution, and lastly the residue was boiled with HCl, and that solution treated for "insoluble" P_2O_5 . In other cases total P_2O_5 has been determined in a separate portion and reverted P_2O_5 obtained by difference.

In case of commercial fertilizers, the presence of calcium salts nearly or entirely compensates the solvent effect of the citrate.

I. *Bones and natural phosphates* (20-30 per cent. P_2O_5).—Use 1 gram substance, 10-15 grams \overline{Ci} , 30-40 c.c. Mg mixture, 350-400 c.c. solution, of which one-quarter is ammonia of specific gravity 0.96.

II. *Superphosphates*. SOLUBLE P_2O_5 , 1-2 grams substance, 5-10 grams \overline{Ci} , 20-30 c.c. Mg mixture, 350 c.c. solution.

REVERTED P_2O_5 , 1-2 grams substance, $11\frac{1}{2}$ or 23 grams \overline{Ci} , 40 c.c. Mg mixture, and more ammonia than usual.

INSOLUBLE P_2O_5 . 2 grams substance, \overline{Ci} , etc., same as soluble.

Comparisons between the Citric and Molybdic methods.

BY MESSRS. WELLS, JENKINS AND ARMSBY.

The results in () are by difference, or in case of total, by addition.

Station No.		By Molybdic method.		By Citric method.		\overline{Ci} used.	Subst. taken.
345	Sol. P_2O_5 ,	7.63	7.77 p. c.	7.65	7.70 p. c.	5 gr.	1 gr.
	Insol. P_2O_5 ,	.92	.94	1.00	.96	5	2
	Total P_2O_5 ,	9.56	9.57	9.61	9.60	8	.5
348	Rev. P_2O_5 ,	14.39		14.13	14.46	23	2
	Insol. P_2O_5 ,	11.52		11.18	11.60	?	
	Total P_2O_5 ,	25.91		25.80	25.95	?	
351	Sol. P_2O_5 ,	4.01		3.85	3.93	?	.8
	Insol. P_2O_5 ,	5.37		5.20		?	1.6
363	Sol. P_2O_5 ,	4.76	4.89	4.75	4.62	5	.8
	Rev. P_2O_5 ,		(.51)	.55	.56	23	2
	Insol. P_2O_5 ,	.43	.46		(.51)		
	Total P_2O_5 ,	5.91	5.67	5.75	5.78	7	1

Station No.		By Molybdic method.		By Citric method.		Ci used.	Subst. taken.
364	Total P ₂ O ₅ ,	21.12	21.13	20.99	20.95	10	1
	Sol. P ₂ O ₅ ,	5.51	5.47	5.42	5.43	5	.8
	Rev. P ₂ O ₅ ,	(2.13)		2.02	1.98	23	2
365	Insol. P ₂ O ₅ ,	4.39	4.30	(4.52)			
	Total P ₂ O ₅ ,	11.91	12.02	11.96	11.94	10	1
372	Total P ₂ O ₅ ,	7.23		7.27	7.28	5	1
	Sol. P ₂ O ₅ ,	1.38	1.47	1.28	1.31	5	2
	Rev. P ₂ O ₅ ,	(3.07)		2.78	2.74	23	2
373	Insol. P ₂ O ₅ ,	.95	.79	(1.11	1.13)*	10	2
	Total P ₂ O ₅ ,	5.38	5.38	(5.18)			
366	Total P ₂ O ₅ ,	17.60	17.56	17.57	17.59	12	1
	Sol. P ₂ O ₅ ,	1.26	1.20	1.01	.85	5	2
	Rev. P ₂ O ₅ ,	(7.60)		6.49	6.97†	23	2
374	Insol. P ₂ O ₅ ,	5.40	5.75	(6.46	6.02)	10	2
	Total P ₂ O ₅ ,	14.40	14.40	(13.90)			
* Rev. and Insol.=3.89 3.87.							
† Rev. and Insol.=12.95 12.99.							
376	Sol. P ₂ O ₅ ,	10.40			3.18	10	2
	Rev. P ₂ O ₅ ,				5.45	23	2
	Insol. P ₂ O ₅ ,				1.35	10	2
				9.98			
377	Sol. P ₂ O ₅ ,	8.79			2.31	10	2
	Rev. P ₂ O ₅ ,				5.19	23	2
	Insol. P ₂ O ₅ ,				1.13	10	2
				8.63			
378	Sol. P ₂ O ₅ ,	12.38			4.76	10	2
	Rev. P ₂ O ₅ ,				5.04	23	2
	Insol. P ₂ O ₅ ,				2.12	10	2
				11.92			
379	Sol. P ₂ O ₅ ,	11.86			4.08	10	2
	Rev. P ₂ O ₅ ,				6.12	23	2
	Insol. P ₂ O ₅ ,				1.24	10	2
				11.44			
380	Sol. P ₂ O ₅ ,	13.33			4.06	10	2
	Rev. P ₂ O ₅ ,				2.02	23	2
	Insol. P ₂ O ₅ ,				7.30	10	2
				13.38			
381	Sol. P ₂ O ₅ ,	11.17			6.84	10	2 gr.
	Rev. P ₂ O ₅ ,				1.75	23	2
	Insol. P ₂ O ₅ ,				2.44	10	2
				11.03			
384	Sol. P ₂ O ₅ ,	13.96			6.05	10	2
	Rev. P ₂ O ₅ ,				1.65	23	2
	Insol. P ₂ O ₅ ,				6.26	10	2
				13.96			
382	Total P ₂ O ₅ ,	12.97	13.03	13.03	13.05	15	1

Station No.		By Molybdic.		By Citric.		Ci used	Subst. used.
383	Total P_2O_5 ,	27.18	27.20	27.42	27.31	15	1
386	Sol. P_2O_5 ,	}	14.21	2.33	2.40		2
	Rev. P_2O_5 ,			7.25	7.43		2
	Insol. P_2O_5 ,			4.48	4.20		2
	Total P_2O_5 ,			(14.05)			2
388	Total P_2O_5 ,	25.21	25.02	25.04	25.03	15	1
390	Total P_2O_5 ,	1.79	1.79	1.77	1.77	7	1
393	Total P_2O_5 ,	7.16	7.19	7.20	7.20	7	1

		Molybdic.	Citric.
427	Total,	26.22	26.26—26.31
440	Total,	24.43	24.40—24.36
422	Total,	22.04	22.16—22.18
443	Total,	21.64	21.94—21.96
442	Total,	19.96	20.04—20.00
434	Total,	19.34	19.57—19.55
430	Sol.,		5.57— 5.56
	Rev.,		1.57— 1.46
	Total,	13.11	13.18—13.15
424	Sol.,		6.03— 5.94
	Rev.,		1.03— 1.16
	Total,	11.28	11.25—11.30
437	Sol.,		6.92— 6.93
	Rev.,		1.11— 1.17
	Total,	10.77	10.81—10.77
433		7.28	7.27— 7.28
421	Sol.,		5.54— 5.63
	Rev.,		0.45— 0.49
	Total,	7.22	7.16— 7.18
423	Sol.,		5.71— 5.76
	Rev.,		.48— .55
	Total,	6.88	6.78— 6.85
439		6.46	6.40— 6.42
435	Sol.,		5.76— 5.67
	Rev.,		.31— .44
	Total,	6.33	6.31— 6.27
417	Sol.,		4.67— ---
	Rev.,		.49— .56
	Total,	5.87	5.87— 5.84
416	Sol.,		2.55— 2.56
	Rev.,		2.01— 2.14
	Total,	5.23	5.54— 5.71
426	Sol.,		3.39— 3.40
	Rev.,		1.59— 1.53
	Total,	6.06	5.94— 5.94
425	Sol.,		2.92— 2.81
	Rev.,		1.59— 1.53
	Total,	4.27	4.26— 4.28
418		1.51	1.35— 1.32

The above comparisons are not a selection, but include all the results obtained up to July, 1880. They were made rapidly and in some cases on material that did not admit of entirely homogeneous sampling. The correspondence of soluble and total P_2O_5 , when alike directly determined by the two methods, is in nearly every case satisfactory.

Reverted and insoluble P_2O_5 do not agree so well, as might be expected, because the extraction by ammonium citrate is not without its uncertainties.

Magnesia Mixture.—The mixture used by Mr. Wells was made as follows: 110 grams crystallized $MgCl_2 \cdot 6H_2O$, 140 grams NH_4Cl , 700 c.c. solution of ammonia sp. gr. 0.96, and water to make one liter. Instead of $MgCl_2 \cdot 6H_2O$, 27 grams of recently calcined magnesia may be dissolved in the equivalent quantity of HCl , the solution boiled with a little calcined magnesia in excess and filtered.

LAW CONCERNING SALE OF FERTILIZERS.

GENERAL STATUTES OF CONNECTICUT.

REVISION OF 1875.

Title 16, Chapter 15.

SEC. 15. Every package of fifty pounds or more of commercial manure sold, or kept for sale, at over one cent a pound, unless prepared essentially from fish and sold as such, shall be marked with its weight and the name and place of business of the manufacturer, or seller, and with a true analysis of the chemical elements and their several amounts contained therein.

SEC. 16. The Secretary of the State Board of Agriculture may procure the analysis of any fertilizer offered for sale, and prosecute any persons who violate the provisions of the preceding section.

Title 20, Chapter 12.

SEC. 5. Any manufacturer, or trader, who shall sell, or offer for sale, any package containing fifty pounds or more of commercial manure, not marked as required by law, or who shall affix thereto a stamp, impress, or card, claiming that it contains five per cent. more of any fertilizing ingredient than it does in fact, shall forfeit ten dollars for each hundred pounds thereof so offered for sale.

“AN ACT ESTABLISHING THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION.

“Be it enacted by the Senate and House of Representatives in General Assembly convened:

“SECTION 1. That for the purpose of promoting agriculture by scientific investigation and experiments, an institution is hereby established, to be called and known as The Connecticut Agricultural Experiment Station.

“SEC. 2. The management of this institution shall be committed to a Board of Control, to consist of eight members, one member to be selected by the State Board of Agriculture, one member by the State Agricultural Society, one member by the Governing Board of the Sheffield Scientific School at New Haven, and one member by the Board of Trustees of the Wesleyan University at Middletown, and two members to be appointed by the Governor of this State, with the advice and consent of the Senate. The

Governor of the State, and the person appointed as hereinafter provided to be the Director of the Station, shall also be *ex officio* members of the Board of Control.

"SEC. 3. After the appointment of the members of the Board of Control as aforesaid, said members shall meet and organize by the choice from among their number of a President, a Secretary, and a Treasurer, who shall be elected annually, and shall hold their respective offices one year, and until the choice of their successors. Five members of said Board shall constitute a quorum thereof for the transaction of business.

"SEC. 4. Said Board shall meet annually after the first meeting thereof, on the third Tuesday in January in each year, at such place in the city of Hartford as may be designated by the President of said Board, and at such other times and places, upon the call of the President, as may be deemed necessary, and may fill vacancies which may occur in the officers of said Board.

"SEC. 5. Said Board of Control shall locate and have the general management of the institution hereby established, and shall appoint a Director, who shall have the general management and oversight of the experiments and investigations which shall be necessary to accomplish the objects of said institution, and shall employ competent and suitable chemists and other persons necessary to the carrying on of the work of the Station. It shall have power to own such real and personal estate as may be necessary for carrying on its work, and to receive title to the same by deed, devise, or bequest. It shall expend all moneys appropriated by the State in the prosecution of the work for which said institution is established, and shall use for the same purpose the income from all funds and endowments which it may hereafter receive from other sources, and may sue and be sued, plead and be impleaded, in all courts, by the name of The Connecticut Agricultural Experiment Station. It shall make an annual report to the Legislature which shall not exceed two hundred printed pages, of which not exceeding three thousand copies shall be printed.

"SEC. 6. The sum of five thousand dollars annually is hereby appropriated to said Connecticut Agricultural Experiment Station, which shall be paid in equal quarterly installments to the Treasurer of said Board of Control, upon the order of the Comptroller, who is hereby directed to draw his order for the same; and the Treasurer of said Board of Control shall be required, before entering upon the duties of his office, to give bond with

surety to the Treasurer of the State of Connecticut in the sum of ten thousand dollars, for the faithful discharge of his duties as such Treasurer.

"SEC. 7. Upon the death or resignation of any of the members of the Board of Control, the authority or institution by which such deceased member was originally appointed shall fill the vacancy so occasioned.

"SEC. 8. Professor Samuel W. Johnson, of New Haven, is hereby empowered to appoint and call the first meeting of said Board of Control as soon as may be practicable after the appointment of the members thereof, and he shall notify all said members of the time and place of said meeting. Two of said members shall hold office for one year, two of them for two years, and two of them for three years; and at said first meeting they shall determine by lot which of said members shall hold office for one year, which for two years, and which for three years. All members of said Board thereafter chosen or appointed, except such as are appointed or chosen to fill vacancies in said Board, shall continue in office for the term of three years from the first day of July next succeeding such appointment.

"SEC. 9. This act shall take effect from its passage.

Approved March 21, 1877."

AN ACT RELATING TO THE PRINTING OF THE REPORT OF THE STATE BOARD OF AGRICULTURE AND OF THE CONNECTICUT AGRICULTURAL EX- PERIMENT STATION.

*Be it enacted by the Senate and House of Representatives in
General Assembly convened :*

SEC. 1. The Comptroller shall annually cause to be printed, at the expense of the State, five thousand copies each of the report of the State Board of Agriculture and of the Connecticut Agricultural Experiment Station.

SEC. 2. All acts and parts of acts inconsistent herewith are hereby repealed.

Approved, March 19, 1879.

INDEX.

	Page
Act Establishing Connecticut Experiment Station, - - -	116
Act relating to printing Report, - - -	118
Agricultural value of Fertilizers, - - -	20
Ammonia, value and cost of, - - -	17, 49
Analyses made during 1880, - - -	21
Apple Pomace, analysis, - - -	67
Ashes, - - -	39
Atwood Bros., Bone, - - -	32-33
Azotin, - - -	35
Baker & Bro., Bone, - - -	32-33
Barrenness caused by excess of urine, etc., - - -	69
Barrenness caused by poison iron-salts, - - -	55
Blood, Dried, - - -	34
Bone Manures, analyses, - - -	30
Bone Manures, valuation, - - -	28, 31
Bowker's Bone Meal for Cattle, - - -	32-33
Bowker's Kitchen Garden Fertilizer, - - -	46-47
Bradley, Superphosphate, - - -	24-25
Brewer's Grains, Kiln Dried, analysis and remarks, - - -	88
Bridgeport Ground Bone (dissolved), - - -	24-25
Bulletins, - - -	10
Castor Pomace, Collins Co., H. J. Baker & Bro., - - -	36
C. B. 15 per cent., Superphosphate, - - -	24-25
Coe's, E. Frank, Superphosphate, - - -	24-25
Coe's, Russell, Superphosphate, - - -	24-25
Complete Manure, Mapes', - - -	24-25
Corn, - - -	79
Corn, analyses of, - - -	81
Corn, choice of varieties of, - - -	83
Corn, Comparative value of Corn Meal and Shelled Corn, - - -	82
Corn, Water Content of Market Corn, - - -	79
Cotton Seed Meal, C. H. Carrington, - - -	36, 84
Cotton Seed Meal, Smith, Northam & Robinson, - - -	36, 84
Dried Blood, - - -	34
Evaporation of Rain Fall, - - -	91
Fertilizers, Cost of Active Ingredients of during 1880, - - -	49
Fertilizers, Explanations of analyses and valuation, - - -	17
Fertilizers, Trade Values for 1879-80, - - -	19
Fertilizers, Trade Values for 1881, - - -	21

	Page
Fish and Potash, - - - - -	24-25
Fish Scrap Guano, - - - - -	35
Flour, analyses, etc., - - - - -	85
Fodders and Feeding Stuffs, - - - - -	74
Fodders and Feeding Stuffs, Explanations of analyses, etc., - - -	75
Fodders and Feeding Stuffs, Nutritive Ratio of, - - - - -	76
Fodders and Feeding Stuffs, Table of Average Composition, etc., of, -	78
Form for Description of Fertilizers, - - - - -	16
Forrester Cabbage Manure, - - - - -	46-47
Forrester Corn Manure, - - - - -	46-47
Forrester Fruit Tree Manure, - - - - -	46-47
Forrester Grass Manure, - - - - -	46-47
Forrester Lawn Dressing, - - - - -	46-47
Forrester Oat Manure, - - - - -	46-47
Forrester Onion Manure, - - - - -	46-47
Forrester Potato Manure, - - - - -	46-47
Forrester Rye Manure, - - - - -	46-47
Forrester Strawberry Manure, - - - - -	46-47
Forrester Tobacco Manure, - - - - -	46-47
Forrester Turnip Manure, - - - - -	46-47
Forrester Wheat Manure, - - - - -	46-47
Guano, Analyses, etc., - - - - -	22, 25
Hay, Analyses of, - - - - -	83
Holyoke Mf'g Co., Bone Saw Dust, - - - - -	32-33
Horn Shavings, - - - - -	36
Instructions for Sampling Fertilizers, - - - - -	14
Instructions for Sampling Seeds, - - - - -	100
Ivory Saw dust, - - - - -	32-33
Law Concerning Sale of Fertilizers, - - - - -	115
Leached Ashes, - - - - -	39
Leather Chips, Value of, - - - - -	65
Lime, Influence on the Effect of Fertilizers, - - - - -	60
Limestone, Magnesian, analysis, - - - - -	73
London Purple, - - - - -	89
Lysimeter, - - - - -	92
Lister Bros., Bone, - - - - -	32-33
Lister Bros., Superphosphate, - - - - -	24-25
Lombard & Matthewson, Superphosphate, - - - - -	24-25
Lombard and Matthewson, Bone, - - - - -	32-33
Maize, - - - - -	79
Manhattan Blood Guano, - - - - -	24-25
Manual of Cattle Feeding, Dr. Armsby, - - - - -	74
Matfield Corn Fertilizers, - - - - -	46-47
Miles Co., Ammoniated Bone Superphosphate, - - - - -	24-25
Mapes' Bone Meal, - - - - -	32-33
Mapes' Complete Manure, - - - - -	24-25
Mapes' Corn Manure, - - - - -	46-47
Mapes' Grass and Grain Manure, - - - - -	46-47

	Page
Mapes' Potato Manure, - - - - -	46-47
Merwin & Co., Dried Blood, - - - - -	34
Muck, - - - - -	52
Muck, analyses of, - - - - -	54
Nitrate of Soda, Sisson & Butler, - - - - -	38
Nitric Acid or Nitrates, value and cost of, - - - - -	17, 49
Nitrogen as Ammonia Salts and Nitrates, - - - - -	49
Nitrogen, Organic, value and cost of, - - - - -	17, 49
Nutritive Ratio of Fodders and Feeding Stuffs, - - - - -	76
Oxalic Acid, symptoms of cattle poisoned by, - - - - -	89
Paris Green on Cornstalks, - - - - -	90
Peat, - - - - -	52
Peat, Experiments on the Effect of Alkalies in Developing the Fer- tilizing Power of, - - - - -	58
Peck Bros., Bone, - - - - -	32-33
Peter Cooper's Ground Bone, - - - - -	32-33
Percolation of Rain Fall, - - - - -	91
Phosphoric Acid, determination of, - - - - -	103
Phosphoric Acid, value and cost of, - - - - -	18, 52
Phosphoric Acid, Relative Fertilizing Value of Soluble and Reverted, - - - - -	60
Pine Island Guano, - - - - -	24-25
Plaster, - - - - -	41
Poisons, - - - - -	89
Pollard Privy Guano, - - - - -	26
Potash, value and cost of, - - - - -	18, 52
Potash Salts, Analyses, - - - - -	39
Potash, Muriate, H. J. Baker & Bro., - - - - -	38
Potash, Muriate, Mapes Formula and Peruvian Guano Co., - - - - -	38
Potash, Sulphate, H. J. Baker & Bro., - - - - -	38
Potash, Sulphate, Mapes Formula and Peruvian Guano Co., - - - - -	38
Privy Guano, Pollard's, - - - - -	26
Quinnipiac Fertilizer Co., Superphosphate, - - - - -	24-25
Quinnipiac Fertilizer Co., Fish Guano, - - - - -	35
Quinnipiac Fertilizer Co., Fish and Potash, - - - - -	24-25
Rain Fall, What becomes of it? - - - - -	91
Salt Waste, Onondaga Salt Association, - - - - -	42
Seed Tests, results of, etc., - - - - -	96
Seeds, Form for Description of, - - - - -	101
Seeds, Instructions for Sampling, - - - - -	100
Smith, Edward, Bone, - - - - -	32-33
Soils, - - - - -	67
Soils, analyses of, - - - - -	70-71
Soluble Pacific Guano, - - - - -	24-25
Special Fertilizers, - - - - -	45-49
Special Fertilizers, analyses, etc., - - - - -	46-47
Special Fertilizers, Comparison according to brand and crop, - - - - -	50
Special Fertilizers, Comparison of Guarantee and Composition, - - - - -	48
Sperry & Barnes, Dried Blood, - - - - -	34

	Page
Stable Manure, - - - - -	43
Station, Act Establishing, - - - - -	116
Station, Present Resources of, Wants of, - - - - -	10
Stockbridge Corn Manure, - - - - -	46-47
Stockbridge Onion Manure, - - - - -	46-47
Stockbridge Root Manure, - - - - -	46-47
Stockbridge Tobacco Manure, - - - - -	46-47
Strong, Barnes, Hart & Co., Dried Blood, - - - - -	34
Sulphate of Ammonia, - - - - -	37
Superphosphates, analyses, etc., - - - - -	22, 26
Superphosphates, comparison of different samples of the same brand, - - - - -	26
Swamp Muck, - - - - -	52
Terms for analyses of Fertilizers, - - - - -	13
Trade Values for 1880 and 1881, - - - - -	19, 21
Valuation of Fertilizers, - - - - -	18, 28
Vegetable Ivory, Dust of, analyses, etc., - - - - -	44, 86
West Avon Poison Case, - - - - -	89
Wheat Flour, analyses, etc., - - - - -	85

REPORT

OF

HON. JOHN D. PARK,

CHIEF JUSTICE,

AS

COMMITTEE ON CLAIM OF J. M. HATHAWAY,

LATE Q. M. GENERAL,

VS. THE STATE.

Printed by Order of the Legislature.

HARTFORD, CONN.:
PRESS OF THE CASE, LOCKWOOD & BRAINARD COMPANY.
1881.

REPORT.

To the Hon. General Assembly of the State of Connecticut:—

The undersigned having been appointed committee by the General Assembly of this State, at the January Session of the same, A. D. 1880, to hear and report to the present session of your Honorable Body respecting the claims against the State of Col. J. M. Hathaway, late Quartermaster-General of this State, begs leave to report; that he met the said Hathaway with his witnesses and counsel, and the counsel for the State, at the office of T. M. Maltbie, Esq., in the City of Hartford, and at the Capitol of the State, on the 24th day of December, 1880, and on the 31st day of January, the 1st, 7th, 8th, 9th, 10th, 12th, and 19th days of February, 1881, respecting said claims, and after a careful examination of the books, vouchers, and various other papers presented by the parties, and having duly considered the various claims of the counsel in favor of, and against said claims, on divers days since the 19th day of said February, he has come to the following conclusion regarding the same.

The entire claim of said Hathaway against the State, consists of three separate and distinct claims. One for the sum of \$210.56, said to have been paid by the said Hathaway as Quartermaster-General, on the 23d day of September, 1861, to the Danbury & Norwalk Railroad Co., for the transportation of troops on their way to the scene of war.

Another of said claims is for the sum of \$3,366.60, said to have been paid by the said Hathaway, as Quartermaster-General, to G. & D. Cook & Co., of New Haven, on the 9th day of September, A. D. 1861, for one thousand complete sets of

infantry equipments for the volunteers, who were then preparing to leave for the war.

The third and last of said claims is for the sum of \$2,705.-00, said to have been paid by the said Hathaway as Quartermaster-General, to Homer Camp of the town of on the 12th day of July, A. D. 1861, for ninety-three Mississippi rifles with sabre bayonets, and twenty Mississippi rifles without such bayonets, to arm in part the Fifth regiment of Connecticut volunteers.

These several claims nowhere appear on the books of Hathaway as Quartermaster-General, but he insists that the receipted bills of these claims, and the duplicates attached to them, became mislaid by the clerks in his office, before an account was made of them, owing to the great amount of business thereon upon them in the early days of the war, when he was expending the money of the State, in arms and equipments, and other necessities, at the rate of about one hundred thousand dollars per month, and in the rush of business, when he was straining every nerve to supply regiment after regiment with arms and equipments as they hurried off to the war; the vouchers of these claims not only became mislaid, but forgotten till they were brought to light in 1872, when the general government refunded to the State the expenditures that had been made in equipping the troops that went to the war. Col. Hathaway declares that Governor Jewell, then Governor of the State, insisted that he should go to Washington, with all his books, papers, and vouchers of his expenditures, and in the investigations there made of the amount of war material furnished by the State, the vouchers of these claims were discovered.

Col. Hathaway was appointed Quartermaster-General in 1857, by Governor Holley, then Governor of this State, and continued to serve in that capacity till the 31st day of August, 1861, when he resigned his office and retired therefrom.

Col. Hathaway was a farmer when he was appointed Quartermaster General. He owned a small farm of from three to five thousand dollars in value. Up to that time farming had been his principal business in life, although he had some

knowledge of military affairs, having served as lieutenant in the army during the Mexican war.

From the year 1857 up to the commencement of the War of the Rebellion on the 12th of April, 1861, Col. Hathaway had but little difficulty in discharging the duties of his office, and he discharged them to the acceptance and satisfaction of all concerned. His expenditures were small, amounting only from three to five thousand dollars per year, and consequently he was employed but a small part of the time. But when the War of the Rebellion broke out (as everyone knows as a matter of history), it found all the North almost wholly unprepared for the contest. Although during the winter of 1860 and 1861 preparations for the rebellion were being made that were of the most threatening and formidable character, still general apathy prevailed at the North. No one supposed that the South was in earnest in their acts of secession, and consequently no counter-preparations were being made all through the North. Every one remembers the profound astonishment that everywhere prevailed as the telegraph spread the news that Fort Sumter was being attacked. Then all the North rose up as one man to put down the rebellion. Consequently there was remarkable activity everywhere. The President called for seventy-five thousand men. Twice or thrice that number volunteered in a day. At this time there was no more manufacturers of war material than there had been in peaceful times, consequently there were vastly more soldiers than arms and equipments. Col. Hathaway found himself overwhelmed with business thus suddenly thrust upon him. He was a man fitted for peaceful times, but was not exactly the man for such an emergency. He employed two clerks to take charge of his books and papers and assist him in the office. He procured arms and equipments wherever they could be found. He contracted with those to furnish them who were not in the business, and succeeded at his wits' end in equipping five regiments and partially equipping two others. But his business was not done with the system and regularity of a cool, calculating man well versed in the duties of his office. His books were kept

by his clerks. Every entry was made by one or the other of them. They are free from interlineations and erasures, and bear intrinsic evidence of their truth.

Col. Hathaway drew from the State treasury the sum of \$459,400 during the few months he remained in office after the commencement of the war, and he has accounted to the State for that entire amount, procuring from his friends, as he declares, a sum of money equal to the claims here in dispute.

The above amount was drawn from the treasury in sums from \$5,000 to \$35,000 at a time. Each time after the first the Comptroller required the production of vouchers sufficient to show substantially what had become of the money previously drawn. Col. Hathaway would take for this purpose such vouchers as came to hand, that had not been presented, without much regard to the order in which the expenditures had been made. Consequently oftentimes vouchers of a subsequent date would be presented before vouchers of a previous date. This state of things continued till nearly the close of his administration.

In regard to the claim of \$210.56, said to have been paid by Col. Hathaway to the Danbury & Norwalk Railroad Co., your committee finds that the debt was paid by Col. Bunce, the immediate successor of Col. Hathaway in the office of Quartermaster-General. This claim was not pressed by the claimant on the hearing. Col. Hathaway frankly admitted that he had no recollection in regard to the transaction; that all he knew on the subject was that he found among his papers a receipted bill by the Railroad Co., and a duplicate of the same, which purported that he paid the amount. Such a bill and duplicate were presented on the hearing, and your committee has no doubt that the claim was made in good faith.

In regard to the sum of \$3,366.60 said to have been paid to G. & D. Cook & Co. of New Haven, for one thousand sets of infantry equipments, your committee finds the following facts:

Col. Hathaway presented on the hearing a voucher for this claim, of which the following is a copy:

"NEW HAVEN, Aug. 26, 1861.

"John M. Hathaway, Q. M.-Gen'l of State of Connecticut,

Bought of G. & D. Cook & Co.:

1,000 cartridge-boxes and picks at \$2.10,	-	-	\$2,100.00
1,000 cartridge-boxes and belts and plates at 50c.,	-	-	500.00
1,000 waist-belts and plates at 25c.,	-	-	250.00
1,000 bayonet-scabbards at 25c.,	-	-	250.00
1,000 caps, pouches, and picks at 25c.,	-	-	250.00
8 packing-boxes,	-	-	16.60
<hr/>			
			\$3,366.60

Received payment,

GEORGE COOK,

Per KIMBALL."

This voucher was accompanied by a duplicate of the same, on which payment was acknowledged in like manner.

It will be observed that there is no date to the receipt on the bill, or on the duplicate, showing at what time the money was paid. On the 9th day of September, 1861, G. & D. Cook & Co., gave to Col. Hathaway a separate and distinct receipt which is as follows.

This receipt was found among other papers shortly before the hearing commenced before your committee, and consequently it was never presented on the hearings heretofore had on this case. There is no doubt in regard to its genuineness. It has unmistakeable marks of age. George Cook, the senior member of the firm of G. & D. Cook & Co., swore to its identity and verity. The finding of this receipt so recently, shows how careless Col. Hathaway has been with his most valuable papers. Your committee feels fully satisfied that Col. Hathaway paid to G. & D. Cook & Co., the amount stated in their bill and receipts, on the 9th day of September 1861, for one thousand sets of infantry equipments, which they had previously delivered. Indeed this fact was not much controverted in the case, by the counsel for the state, but their claim was that on the 26th day of June, 1861, Col. Hathaway paid to George Cook, the senior member of the firm, the sum of \$4,037.10 for one thousand sets of infantry

equipments, which was in fact a fictitious claim, consequently this sum more than balances the September claim, and leaves Col. Hathaway indebted to the state.

This claim is based on the following facts:

On the 9th day of June 1861, Col. Hathaway paid to Calhoun, Lacy & Co., of Bridgeport, \$3,367.10 for one thousand sets of infantry equipments which had been delivered by them.

The bill was receipted as follows:

“CALHOUN & LACY & Co.

By George Cook.”

On the books of Col. Lacy & Co., Col. Hathaway is given credit for the full amount of the claim.

The phraseology of this bill is strikingly similar to the Cook bill of the 26th of June, and the claim was that the Cook bill was a mere copy of the Col. Lacy & Co. bill, and consequently was not based on a real transaction.

These two bills appear on the Journal and Ledger of Col. Hathaway, entered by one of his clerks under the date of June 19th and June 26th as paid. Manifestly the entries were made on the Journal at the time they severally bear date, for they appear among other entries on those days, and especially is this true of the Cook entry, for it appears in the middle of a full page of transactions. These vouchers, with others, were examined by the comptroller on the day and time of their occurrence and were approved. They were audited by the governor, comptroller, and treasurer not long thereafter and were again approved. They were again examined by General Tyler and H. J. Morse, and nothing suspicious was discovered in relation to them. They passed under the scrutiny of David Clark and Samuel Dodd, auditors and special auditors of the accounts of Col. Hathaway on two separate occasions, and were allowed. And still again they were examined by the officers of the general government in 1872, and both of them were again considered genuine, and the amounts of both were refunded to the state. It is certainly quite remarkable that none of these examinations should have discovered that one of these vouchers was a copy of the other, if such was the fact.

The claim of the counsel for the state not only involved Col. Hatheway in a gross fraud, but George Cook likewise. There is no room for mistake in relation to the matter. The books of Col. Hathaway show two separate and distinct payments, separated from each other by seven days, for different amounts, and the last payment was made to George Cook, over his own signature, and acting for himself alone. It could not have been received for Col. Lacy & Co., for that payment had already been made. There is no escape from the conclusion, that either these two bills are honest, or that these two men were grossly dishonest. If they were dishonest, it is strange indeed that they should have had the two bills so nearly alike in phraseology. And it is further strange if Col. Hathaway so desired money that he was willing to engage in a scheme of this character for gain, that he should have forgotten a genuine transaction of nearly the same amount, not long thereafter, when he was out of office, and not overwhelmed with business as he was during the month of June.

But what seems to your committee to put this question beyond reasonable doubt is the further fact that an inventory of all the sets of equipments that the State had when Col. Hathaway went out of office, necessarily requires the thousand sets claimed to have been sold by George Cook to Col. Hathaway, on the 26th day of June, to make up the number. If the June thousand, or the August thousand in controversy, paid for in September, be excluded from the computation, then the State had eight hundred and ninety-two more sets of equipments than they ever purchased, or which can be otherwise accounted for. The discrepancy between eight hundred and ninety-two and one thousand is accounted for by the fact that in the purchase and distribution of a large number of equipments some are unavoidably lost. The percentage of loss in this case was about one-half of one per cent.

From a careful review of all the evidence and claims which have been made on the subject now under consideration, your committee is constrained to believe that there is justice in this claim of Col. Hathaway.

In regard to the remaining claim of \$2,705.00 said to have been paid to Homer Camp for Mississippi rifles, the facts are as follows :

Col. Hathaway presented on the hearing, the following voucher, which is the foundation of this claim.

"STATE OF CONNECTICUT,
QUARTERMASTER-GENERAL'S OFFICE,
HARTFORD, July 12, 1861.

GEN. J. M. HATHAWAY,

		Bought of H. CAMP,
93	Mississippi Rifles, with Sabre bayonets, at \$25,	\$2,325.00
20	Mississippi Rifles, without bayonets, at \$18.75,	375.00
5	Cases, \$1.00, - - - - -	5.00
		\$2,705.00

Received payment,

H. CAMP."

There was a duplicate of this bill, executed in like manner, which was lost in some of the former hearings respecting this claim. There is no entry on the book of Col. Hathaway of the payment of the money, or the receipt of the rifles described in this voucher. But there is no doubt that Col. Hathaway satisfied Homer Camp for the amount of this bill, either in money or merchandise, on the day described in the voucher, and the only question is, in what did the satisfaction consist?

Col. Hathaway declares that the payment was made in money ; that he distinctly remembers the transaction ; that the rifles were purchased to arm in part the Fifth regiment of volunteers who were then preparing to leave for the seat of war.

The counsel for the State insist that the satisfaction for the bill consisted in merchandise belonging to the State ; that two old six pound cannon, and a large quantity of other old arms were given in barter for the rifles. Homer Camp has long since been deceased, and it is unfortunate that your committee, and all others interested, are deprived of the benefit of his testimony. It appears by the certificate of Edward

Preston, who was Regimental Quartermaster of the Fifth regiment, that he received of Col. Hathaway, on the 29th day of July, 1861, among other arms and equipments, five hundred and fifty Mississippi rifles for the Fifth regiment.

This certificate was given at the time the rifles were delivered to him.

It appears by the bank-book of Homer Camp that he paid Col. Hathaway small sums of money from time to time during the year 1860, which in the aggregate amount to the sum of one thousand and sixty-five dollars. Nothing appears on the books of Col. Hathaway regarding these transactions, or what was done with the money thus received. His account concerning the matter is that the money was received on the sale of old, unservicable arms, and was in part expended in the repair of other arms; that the remainder, together with the money received on the sale of two six-lb. cannon for the sum of about six hundred dollars, was paid into the hands of Governor Buckingham; that Governor Buckingham expended the money in the purchase of one hundred rifles; that the Governor requested that no account be made of the transactions, because he did not wish it to be known that the State was arming; that no account of them was made accordingly, and no statement regarding the same appeared in his report to the legislature in the spring of 1861, for the same reason; that although at the time the legislature convened the State was arming its troops as fast as possible; still as the fiscal year closed the first of April, this report being then prepared, it was confined to the fiscal year; but in his report to the legislature the following year, a statement was made of the sale of the cannon, and that the proceeds were expended in the purchase of arms. The bank-book of Homer Camp shows no deposit of any such sum of money as Col. Hathaway claims to have paid him on the 12th of July, 1861. The largest amount deposited soon after that time is the sum of \$460. What he did with the money, if he received it, does not appear.

These are the facts regarding this claim, and your committee is inclined to believe, though with a good deal of hesi-

tation, that Col. Hathaway is in the right regarding this claim.

The voucher is in the handwriting of Homer Camp himself. He was an intelligent, moneyed, business man. The voucher purports to have been paid in money; and it seems strange, indeed, if merchandise had been received in lieu of money for the claim, or if the transaction had been one of barter, that the voucher should not have so stated.

There is no doubt that the rifles were received by Col. Hathaway. The signature of Homer Camp attests the fact. It is not pretended that any one else paid for them but Col. Hathaway. And your committee is inclined to think that the weight of the evidence is in favor of the claim.

All which is respectfully submitted.

Dated at Norwich this the seventh day of March, 1881.

JOHN D. PARK,
Committee.

A. P. Hyde and C. R. Chapman appeared as counsel for State.

T. M. Waller and Geo. C. Ripley appeared as counsel for claimant.

PROPOSED RESOLUTION.

House Joint Resolution No. 188.

Transmitted by the Secretary of State to the General Assembly.

Resolution paying J. M. Hathaway amount due him on report of John D. Park, Chief Justice.

GENERAL ASSEMBLY,

January Session, A.D. 1881.

Resolution paying John M. Hathaway the amount of claim found due from the State by Hon. John D. Park, a committee appointed by the General Assembly.

Resolved by this Assembly: That the Comptroller be directed to draw his order on the Treasurer in favor of John M. Hathaway, late Quartermaster-General, for the sum of nine thousand three hundred and fifty dollars, being amount due to him upon the finding and report of Hon. John D. Park, Committee, with interest thereon from the first day of March, 1872.

STATEMENT OF VOTE,

NOVEMBER ELECTION,

1880.

Tabulated from Returns in the Office of the
Secretary of State.

By Authority of the General Assembly.

HARTFORD, CONN.:

THE CASE, LOCKWOOD & BRAINARD CO., PRINTERS.

1881.

HARTFORD COUNTY.	Whole Number of Names on Registry List.	Whole Number Checked as having Voted.	Whole Number not Checked.	Number of Ballots found in each box, viz.:		Number of Ballots in each box not counted as in the wrong box, viz.:		Number of Ballots not counted for being double, viz.:		Number of Ballots Rejected for other causes		*Population, Census, 1880.
				General.	Representative.	General.	Representative.	General.	Representative.	General.	Representative.	
Hartford.....	9,987	9,343	644	9,331	9,285	4	3	7	1	....	....	42,553
Avon.....	268	250	18	250	249	....	....	....	....	....	....	1,058
Berlin.....	597	554	43	551	551	1	....	....	....	....	....	2,385
Bloomfield.....	385	353	32	353	348	....	....	....	....	....	....	1,346
Bristol.....	1,317	1,237	80	1,237	1,236	1	2	1	....	....	....	5,347
Burlington.....	286	265	21	265	263	....	1	....	....	....	....	1,224
Canton.....	566	537	29	537	523	....	....	....	....	....	....	2,299
East Granby.....	217	212	5	213	212	....	....	....	....	....	....	754
East Hartford.....	860	803	57	802	801	....	....	....	....	....	....	3,500
East Windsor.....	631	586	45	588	583	2	....	....	....	....	....	3,019
Enfield.....	1,253	1,194	59	1,197	1,194	....	....	....	2	....	....	6,754
Farmington.....	654	608	46	605	606	1	1	....	....	....	....	3,014
Glastonbury.....	885	844	41	848	844	....	1	2	....	....	....	3,580
Granby.....	399	373	26	374	373	....	....	1	....	....	....	1,340
Hartland.....	187	176	11	176	174	....	....	....	....	....	....	643
Manchester.....	1,332	1,167	165	1,164	1,151	1	6	....	4	1	6	6,462
Marlborough.....	105	100	5	98	100	....	....	....	....	1	1	391
New Britain.....	2,953	2,795	158	2,795	2,769	1	....	2	1	....	....	13,978
Newington.....	202	198	4	199	195	....	....	....	....	....	....	934
Plainville.....	458	430	28	440	426	1	....	2	....	3	....	1,930
Rocky Hill.....	276	259	17	259	251	....	....	....	2	2	1	1,109
Simsbury.....	....	....	....	....	....	....	....	....	....	....	....	1,830
Southington.....	1,332	1,260	72	1,266	1,259	2	....	2	....	2	....	5,411
South Windsor...	497	460	37	460	451	....	....	....	....	....	....	1,902
Suffield.....	873	841	32	841	836	....	....	1	....	1	....	3,225
West Hartford.....	439	406	33	406	402	....	....	....	....	....	....	1,828
Wethersfield.....	428	406	22	405	403	....	....	....	....	....	....	2,173
Windsor.....	733	676	57	676	671	....	....	....	....	1	....	3,056
Windsor Locks...	480	456	24	456	456	....	....	....	....	....	....	2,332
	28,600	26,789	1,811	26,792	26,612	14	14	18	10	11	8	125,377

* The population here given is the result of the first count, and is subject to possible corrections.

NEW HAVEN COUNTY.	Whole Number of Names on Registry List.	Whole Number Checked as Voted.	Whole Number not Checked.	Number of Ballots found in each box, viz.:		Number of Ballots in each box not counted as in the wrong box, viz.:		Number of Ballots not counted for being double, viz.:		Number of Ballots Rejected for other causes.		Population, Census, 1880.
				General.	Representative.	General.	Representative.	General.	Representative.	General.	Representative.	
New Haven.....	14,635	13,802	*839	13,843	13,721	38	6	21	2	5	2	62,882
Beacon Falls.....	75	67	8	67	64	1	....	....	....	....	....	379
Bethany.....	169	155	14	155	143	....	....	....	....	....	....	637
Branford.....	815	747	68	747	720	....	....	....	....	....	....	3,047
Cheshire.....	558	518	40	518	518	....	1	....	....	....	....	2,284
Derby.....	2,466	2,355	111	2,362	2,346	5	1	5	1	....	1	11,649
East Haven.....	798	752	46	758	746	2	....	4	....	4	....	3,067
Guilford.....	720	668	52	668	665	....	....	....	....	....	....	2,782
Hamden.....	800	692	108	692	669	2	....	2	....	2	2	3,408
Madison.....	495	428	67	428	422	....	....	....	....	....	....	1,669
Meriden.....	3,922	3,759	163	3,762	3,759	....	11	1	....	1	11	18,340
Middlebury.....	161	151	10	151	144	....	....	....	....	....	....	687
Milford.....	903	844	59	844	829	....	....	....	....	....	....	3,347
Naugatuck.....	946	860	86	861	849	1	....	1	2	....	....	4,272
North Branford..	286	270	18	271	262	....	....	....	....	....	....	1,025
North Haven....	402	372	30	372	364	....	....	....	....	....	....	1,763
Orange.....	785	711	74	711	707	....	1	....	1	....	1	3,341
Oxford.....	273	264	*8	264	263	....	....	1	....	....	....	1,120
Prospect.....	141	129	12	129	121	....	....	....	....	....	....	492
Seymour.....	554	524	30	524	517	1	....	....	....	....	1	2,318
Southbury.....	368	332	36	332	330	....	1	1	....	1	1	1,740
Wallingford.....	1,114	1,005	109	1,044	1,023	....	7	....	1	....	....	4,686
Waterbury.....	4,575	4,205	370	4,206	4,202	4	....	....	....	....	....	20,269
Wolcott.....	127	121	6	121	115	....	....	....	....	....	....	493
Woodbridge.....	204	189	15	191	171	1	....	....	....	1	....	829
	36,292	33,920	*2,379	34,021	33,676	55	28	36	7	14	19	156,526

* Error in Returns.

NEW LONDON COUNTY.	Whole Number of Names on Registry List.	Whole Number Checked as having Voted.	Whole Number Checked not Checked.	Number of Ballots found in each box, viz.:		Number of Ballots in each box not counted as in the wrong box, viz.:		Number of Ballots not counted for being double, viz.:		Number of Ballots Rejected for other causes.		Population, Census, 1880.
				General.	Representative.	General.	Representative.	General.	Representative.	General.	Representative.	
New London.....	2,400	2,176	224	2,176	2,165	2	...	...	1	...	...	10,529
Norwich.....	4,367	3,935	432	3,940	3,419	6	...	1	2	...	...	21,141
Bozrah.....	195	182	13	182	175	....	....	...	...	...	...	1,155
Colchester.....	775	622	*113	664	659	2	....	...	...	...	...	2,974
East Lyme.....	580	528	*62	356	346	1	1	...	...	...	...	1,731
Franklin.....	173	*156	17	156	153	....	....	...	...	...	...	686
Griswold.....	581	539	42	539	514	....	....	...	...	...	1	2,745
Groton.....	599	520	79	521	521	1	....	1	...	1	1	5,127
Lebanon.....	476	443	33	443	426	3	2	3	...	3	2	1,845
Ledyard.....	369	331	38	325	319	1	....	1	...	1	...	1,373
Lisbon.....	163	150	13	150	147	....	....	...	...	...	...	630
Lyme.....	294	258	36	258	253	....	....	...	...	...	...	1,025
Montville.....	629	598	31	597	594	1	....	...	...	...	...	2,666
No. Stonington...	490	455	35	455	436	....	....	...	4	...	...	1,769
Old Lyme.....	347	306	41	304	295	....	....	...	2	...	1	1,387
Preston.....	676	613	63	612	592	....	....	...	...	...	...	2,519
Salem.....	158	154	4	152	148	..	....	...	...	1	...	574
Sprague.....	326	297	29	297	294	....	....	...	...	...	...	3,207
Stonington.....	1,554	1,388	166	1,387	1,386	....	....	...	...	...	...	7,353
Waterford.....	651	599	52	595	594	....	....	...	...	...	...	2,701
	15,803	14,250	1,523	14,109	13,436	17	3	3	9	7	5	73,137

* Error in Returns.

FAIRFIELD COUNTY.	Whole Number of Registry List.	Whole Number Checked as having Voted.	Whole Number not Checked.	Number of Ballots found in each box, viz.:		Number of Ballots in each box not counted as in the wrong box, viz.:		Number of Ballots not counted for being double, viz.:		Number of Ballots Rejected for other causes.		Population, Census, 1880.
				General.	Representative.	General.	Representative.	General.	Representative.	General.	Representative.	
Bridgeport,.....	6,945	6,386	559	6,395	6,371	10	1	5	5	....	1	29,148
Bethel.....	659	642	17	645	.....	2	.....	2	2	....	....	2,726
Brookfield.....	308	279	29	.....	.....	.....	.....	1	.....	....	1	1,152
Darien.....	458	436	22	436	430	.....	1	1	.....	....	1	1,948
Danbury.....	2,583	2,437	146	2,451	2,418	10	6	4	4	....	1	11,669
Easton.....	334	318	16	318	315	.....	.....	.....	.....	3	....	1,145
Fairfield.....	912	815	97	818	815	1	.....	.....	.....	....	....	3,748
Greenwich.....	1,745	1,608	137	1,608	1,604	5	2	.....	2	1	....	7,892
Huntington.....	564	524	40	524	521	1	.....	.....	.....	....	....	2,499
Monroe.....	318	300	18	302	296	2	.....	.....	.....	....	....	1,157
New Canaan.....	645	626	*22	623	618	.....	1	3	.....	....	....	2,673
New Fairfield.....	203	195	8	199	184	.....	.....	2	.....	....	....	791
Newtown.....	884	813	71	798	781	1	.....	2	.....	2	....	4,013
Norwalk.....	3,083	2,870	213	2,872	2,858	11	2	4	.....	1	1	13,956
Reading.....	404	388	16	388	388	.....	.....	.....	.....	....	....	1,540
Ridgefield.....	558	522	36	521	518	.....	.....	.....	.....	....	1	2,028
Sherman.....	215	210	5	210	209	.....	.....	11	.....	....	....	828
Stamford.....	2,382	2,169	213	2,166	2,156	.....	3	.....	1	....	....	11,298
Stratford.....	989	940	49	940	932	.....	.....	.....	.....	....	....	4,251
Trumbull.....	363	350	13	350	348	1	.....	.....	.....	....	....	1,323
Weston.....	248	231	17	231	230	.....	.....	.....	.....	....	2	918
Westport.....	845	753	92	751	735	.....	.....	3	.....	....	....	3,477
Wilton.....	509	449	60	449	448	1	.....	.....	.....	....	....	1,864
	26,154	24,261	1,896	23,995	23,175	45	16	38	14	7	8	112,044

* Error in Return.

WINDHAM COUNTY.	Whole Number of Names on Registry List.	Whole Number Checked as having Voted.	Whole Number not Checked.	Number of Ballots found in each box, viz.:		Number of Ballots in each box not counted as in the wrong box, viz.:		Number of Ballots not counted for being double, viz.:		Number of Ballots Rejected for other causes.		Population, Census, 1880.
				General.	Representative.	General.	Representative.	General.	Representative.	General.	Representative.	
Brooklyn.....	404	369	35	369	358	....	....	....	....	....	....	2,308
Ashford.....	331	309	*31	....	300	....	....	....	....	....	....	1,041
Canterbury.....	347	315	32	314	315	....	1	....	....	....	....	1,272
Chaplin.....	157	145	12	145	139	....	....	....	....	....	....	627
Eastford.....	254	224	30	224	220	....	....	....	....	....	....	855
Hampton.....	215	195	20	195	192	....	....	....	....	....	....	827
Killingly.....	1,288	1,162	126	1,163	1,132	6	....	....	....	1	....	6,921
Plainfield.....	678	635	43	635	629	....	....	1	....	....	....	4,021
Pomfret.....	332	294	38	293	288	....	....	....	2	....	....	1,470
Putnam.....	923	777	146	781	802	....	....	....	2	1	2	5,827
Scotland.....	175	160	15	159	159	....	....	....	....	....	....	590
Sterling.....	222	201	21	200	196	....	....	....	....	....	....	957
Thompson.....	624	552	72	553	540	1	....	....	....	....	....	5,051
Voluntown.....	269	243	26	243	238	....	....	....	....	....	....	1,186
Windham.....	1,602	1,378	224	1,377	1,377	4	2	....	2	....	....	8,265
Woodstock... ..	639	581	58	581	549	....	....	....	....	....	....	2,639
	8,460	7,540	929	7,232	7,434	11	3	1	6	2	2	43,857

* Error in Return.

LITCHFIELD COUNTY.	Whole Number of Names on Registry List.	Whole Number Checked as having Voted.	Whole Number Checked, not.	Number of Ballots found in each box, viz.:		Number of Ballots in the wrong box, viz.:		Number of Ballots not counted, viz.:		Number of Ballots Rejected for other causes.		Population, Census, 1880.
				General.	Representative.	General.	Representative.	General.	Representative.	General.	Representative.	
Litchfield.....	789	727	*	725	724	.....	.....	1	.....	.....	.....	3,410
Barkhamsted.....	342	325	17	325	323	.....	.....	.....	.....	.....	.....	1,298
Bethlehem.....	189	183	6	183	183	.....	.....	.....	.....	.....	1	655
Bridgewater.....	196	188	8	188	187	.....	.....	.....	.....	.....	.....	708
Canaan.....	322	297	25	.....	294	.....	.....	.....	.....	.....	.....	1,157
Colebrook.....	258	236	22	236	234	.....	.....	.....	.....	.....	.....	1,148
Cornwall.....	415	392	23	390	387	.....	.....	.....	.....	.....	.....	1,583
Goshen.....	241	229	12	230	230	.....	.....	.....	.....	.....	.....	1,093
Harwinton.....	273	242	31	243	239	.....	.....	.....	.....	.....	.....	1,016
Kent.....	397	377	20	377	377	.....	.....	1	.....	.....	.....	1,622
Morris.....	191	179	12	179	175	.....	.....	.....	.....	.....	.....	627
New Hartford.....	595	553	42	554	548	.....	.....	.....	.....	.....	.....	3,302
New Milford.....	1,085	996	89	996	990	1	.....	.....	.....	.....	.....	3,907
North Canaan.....	393	355	38	355	346	.....	.....	.....	.....	.....	.....	1,537
Norfolk.....	313	296	17	295	299	.....	.....	1	.....	1	.....	1,418
Plymouth.....	557	523	34	523	517	.....	.....	.....	.....	.....	.....	2,350
Roxbury.....	265	256	9	256	250	.....	.....	.....	.....	.....	1	950
Salisbury.....	878	816	62	817	802	3	.....	.....	.....	.....	.....	3,715
Sharon.....	633	573	60	575	571	.....	.....	2	.....	.....	.....	2,580
Thomaston.....	722	670	52	663	650	.....	.....	1	.....	.....	.....	3,225
Torrington.....	844	796	48	796	794	1	.....	.....	1	.....	.....	3,327
Warren.....	190	168	22	168	168	.....	.....	.....	.....	.....	1	639
Washington.....	405	376	29	375	376	.....	.....	.....	.....	.....	.....	1,589
Watertown.....	511	479	32	479	478	.....	.....	.....	.....	.....	.....	1,897
Winchester.....	1,295	1,214	81	1,216	1,211	1	1	.....	.....	2	.....	5,142
Woodbury.....	566	543	23	543	536	.....	.....	2	.....	2	.....	2,148
	12,865	11,989	* 814	11,688	11,888	6	1	8	1	6	3	52,043

* No Return from Litchfield.

	Whole Number of Names on Regis- try List.	Whole Number Checked as having Voted.	Whole Number not Checked.	Number of Ballots found in each box, viz.:		Number of Ballots in each box not counted as in the wrong box, viz.:		Number of Ballots not counted for being double, viz.:		Number of Ballots Rejected for other causes.		Popula- tion, 1880.
				General.	Repre- sentative.	General.	Repre- sentative.	General.	Repre- sentative.	General.	Repre- sentative.	
Middletown.....	2,661	2,460	201	2,460	2,459	....	1	1	....	....	1	11,731
Haddam.....	592	560	32	559	555	....	....	....	1	....	1	2,419
Chatham.....	502	470	32	462	470	....	....	1	....	....	....	1,967
Chester.....	306	287	19	287	274	....	....	....	....	....	....	1,177
Clinton.....	414	372	42	372	363	....	....	....	....	1	1	1,402
Cromwell.....	408	385	23	387	385	....	....	1	....	....	....	1,640
Durham.....	282	271	11	271	271	....	....	....	....	....	....	990
East Haddam.....	770	706	64	706	....	2	....	....	....	....	....	3,032
Essex.....	555	514	41	514	506	....	1	....	....	....	1	1,855
Killingworth.....	230	197	33	197	197	....	....	....	....	....	....	748
Middlefield.....	218	203	15	203	196	....	....	....	....	....	....	928
Old Saybrook....	323	292	31	290	292	....	....	....	....	....	....	1,302
Portland.....	818	705	113	700	690	....	....	1	....	1	....	4,156
Saybrook.....	372	346	26	345	335	....	....	....	2	....	....	1,362
Westbrook.....	265	245	20	244	238	....	....	....	....	....	....	878
	8,716	8,013	703	7,997	7,231	2	2	4	• 3	2	4	35,587

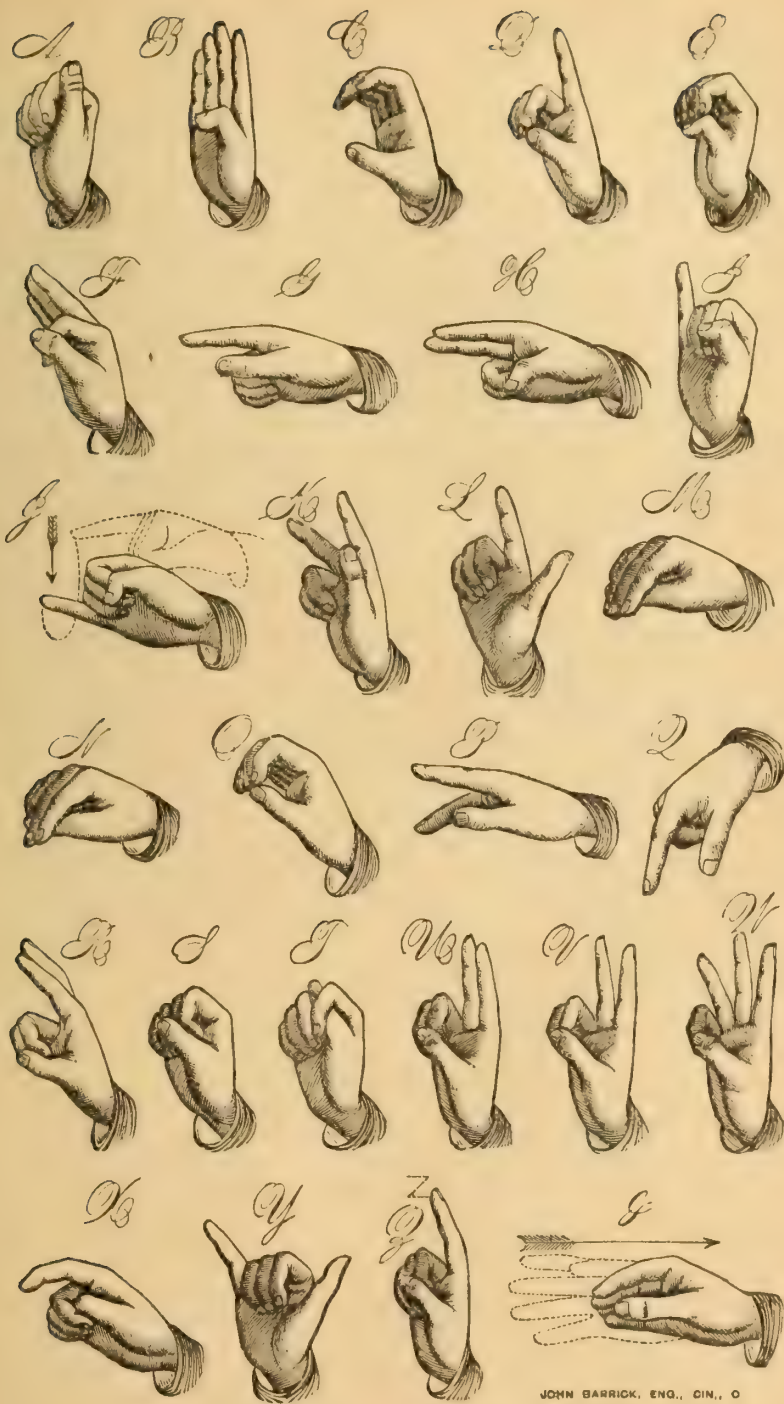
TOLLAND COUNTY.	Whole Number of Names on Registry List.	Whole Number Checked as having Voted.	Whole Number not Checked.	Number of Ballots found in each box, viz.:		Number of Ballots in each box not counted as in the wrong box, viz.:		Number of Ballots not counted for being double, viz.:		Number of Ballots Rejected for other causes.		Population, Census, 1880.
				General.	Representative.	General.	Representative.	General.	Representative.	General.	Representative.	
Tolland.....	310	294	16	294	282	....	....	....	....	....	....	1,169
Andover.....	133	126	7	126	125	....	....	....	....	....	....	428
Bolton.....	156	144	12	143	143	....	....	....	....	....	....	512
Columbia.....	181	174	7	174	170	....	....	....	....	....	....	757
Coventry.....	529	482	47	482	480	....	....	....	....	....	....	2,043
Ellington.....	400	362	38	362	356	....	....	....	....	....	....	1,569
Hebron.....	306	280	26	280	280	....	....	....	1	....	1	1,243
Mansfield.....	543	475	68	478	468	3	....	2	....	....	....	2,154
Somers.....	337	317	20	317	313	....	....	....	....	....	....	1,242
Stafford.....	1,017	950	67	950	950	....	....	....	....	....	....	4,455
Union.....	170	163	7	....	....	....	....	....	....	....	....	539
Vernon.....	1,433	1,326	107	1,322	1,316	2	....	....	....	1	....	6,915
Willington.....	279	255	24	254	250	....	1	....	....	....	....	1,086
	5,794	5,348	446	5,182	5,133	5	1	2	1	1	1	24,112

SUMMARY OF COUNTIES.	Whole Number of Names on Registry List.	Whole Number Checked as having Voted.	Whole Number not Checked.	Number of Ballots found in each box, viz.:		Number of Ballots in each box not counted as in the wrong box, viz.:		Number of Ballots not counted for being double, viz.:		Number of Ballots Rejected for other causes.		Popula- tion, Census, 1880.
				General.	Repre- sentative.	General.	Repre- sentative.	General.	Repre- sentative.	General.	Repre- sentative.	
Hartford	28,600	26,789	1,811	26,792	26,612	14	14	18	10	11	8	125,377
New Haven	36,292	33,920	2,379	34,021	33,676	55	28	36	7	14	19	156,526
New London	15,803	14,250	1,523	14,109	13,436	17	3	3	9	7	5	73,137
Fairfield	26,154	24,261	1,896	23,995	23,175	45	16	38	14	7	8	112,044
Windham	8,460	7,540	929	7,232	7,434	11	3	1	6	2	2	43,857
Litchfield	12,865	11,989	814	11,688	11,888	6	1	8	1	6	3	52,043
Middlesex	8,716	8,013	703	7,997	7,231	2	2	4	3	2	4	35,587
Tolland	5,794	5,348	446	5,182	5,133	5	1	2	1	1	1	24,112
	142,684	132,110	10,501	131,016	128,585	155	68	110	51	50	50	622,683





AMERICAN ASYLUM.



THE
SIXTY-FIFTH ANNUAL REPORT
OF THE
DIRECTORS AND OFFICERS
OF THE
AMERICAN ASYLUM
AT HARTFORD,
FOR THE
EDUCATION AND INSTRUCTION
OF THE
DEAF AND DUMB.

Presented to the Asylum, April 23, 1881.

HARTFORD, CONN.:
PRESS OF THE CASE, LOCKWOOD & BRAINARD COMPANY.
1881.

BOARD OF DIRECTORS.

PRESIDENT.

HON. CALVIN DAY.

VICE-PRESIDENTS.

ROLAND MATHER,	PINCKNEY W. ELLSWORTH,
NATHANIEL SHIPMAN,	JONATHAN B. BUNCE,
GEO. M. BARTHOLOMEW,	ROWLAND SWIFT,
JOHN C. PARSONS,	FRANCIS B. COOLEY.

DIRECTORS.

(By Election.)

JOHN C. DAY,	SAMUEL N. KELLOGG,
WILLIAM M. HUDSON,	WILLIAM J. WOOD,
FRANK W. CHENEY,	DANIEL R. HOWE,
EDWARD B. WATKINSON,	LUCIUS A. BARBOUR,
GEORGE M. WELCH,	ATWOOD COLLINS.

EX-OFFICIO.

HIS EXCELLENCY, HARRIS M. PLAISTED, Governor of Maine.
HON. JOSEPH O. SMITH, Secretary of State.

HIS EXCELLENCY, NATT HEAD, Governor of New Hampshire.
HON. A. B. THOMPSON, Secretary of State.

HIS EXCELLENCY, ROSWELL FARNHAM, Governor of Vermont.
HON. GEO. W. NICHOLS, Secretary of State.

HIS EXCELLENCY, JOHN D. LONG, Governor of Massachusetts.
HON. HENRY B. PEIRCE, Secretary of State.

HIS EXCELLENCY, ALFRED H. LITTLEFIELD, Gov'r of Rhode Island
HON. JOSHUA M. ADDEMAN, Secretary of State.

HIS EXCELLENCY, HOBART B. BIGELOW, Governor of Connecticut
HON. CHARLES E. SEARLS, Secretary of State.

SECRETARY.

ATWOOD COLLINS.

TREASURER.

ROLAND MATHER.

DIRECTING COMMITTEE.

GEORGE M. WELCH, CHAIRMAN.
FRANCIS B. COOLEY. JOHN C. PARSONS

OFFICERS AND TEACHERS.

PRINCIPAL.

JOB WILLIAMS, M.A.

INSTRUCTORS.

RICHARD S. STORRS, M.A.,	MARY A. MANN,
GILBERT O. FAY, Ph.D.,	CAROLINE C. SWEET,
ABEL S. CLARK, M.A.,	KATE C. CAMP,
GEORGE F. STONE,	IDA V. HAMMOND,
WILLIAM H. WEEKS,	JANE B. KELLOGG,
JOHN E. CRANE, B.A.,	LUCY S. WILLIAMS,
NELLIE W. STONE.	

TEACHERS OF ARTICULATION.

ADA R. KING,
ABBY E. READ.

TEACHER OF DRAWING.

GEORGE F. STONE.

ATTENDING PHYSICIAN.

GEORGE W. AVERY, M.D.

STEWARD.

HENRY KENNEDY.

ASSISTANT STEWARD.

SALMON CROSSETT.

BOYS' SUPERVISOR.

ALBERT A. SMALL.

MATRON.

Miss MARGARET GREENLAW.

ASSISTANT MATRONS.

Mrs. REBECCA A. CADY,
Miss ELIZA GREEN.

NOAH A. SMITH, MASTER OF THE CABINET SHOP.
WILLIAM B. FLAGG, MASTER OF THE SHOE SHOP.
Miss SARAH A. BEACH, MISTRESS OF THE TAILORS' SHOP.

DIRECTORS' REPORT.

TO THE PATRONS AND FRIENDS OF THE AMERICAN ASYLUM:

The year which has just closed has been one of general health and prosperity at the Asylum. Reference to the accompanying reports of the Principal and other officers will show the details and result of the management, and they require no comment from us.

Mr. John Beach, the last survivor of the sixty-three original corporators of the Asylum, in the charter of May 1816, died at his home in this city on the 21st of August, 1880. It seems a fit occasion to republish here the names of these founders of our institution, and to acknowledge anew our obligations to their energy and benevolence. In order to appreciate their efforts, we must remember that at the time no systematic and intelligent education of the Deaf and Dumb was known in this country. This attempt was an experiment, and in common with most novel enterprises, it met with many obstacles and discouragements. There was small prospect of, and no reliance upon the Governmental and State aid which has since been liberally bestowed in the foundation of similar establishments. All the original expenses of this undertaking were furnished by individual liberality; and this at a period when the poverty of the country, the meagerness of incomes, and the scarcity of money, were such as can be realized with difficulty by the generation of to day.

The corporators were: John Caldwell, Nathaniel Terry, Daniel Wadsworth, Mehitable Wadsworth, Susan Tracy, Ward Woodbridge, Henry Hudson, Daniel Buck, Mason F. Cogswell, Joseph Battell, William H. Inlay, Charles Sigourney, David Porter, David McKinney, Isaac Bull, Thomas S.

Williams, John Morgan, Samuel Tudor, Jr., John Butler, George Goodwin, John Beach, James Ward, Roswell Bartholomew, George Smith, Joseph Rogers, Moses Tryon, Jr., Nathan Strong, Jr., Charles Seymour, Jas. H. Wells, Jonathan W. Edwards, William W. Ellsworth, William Watson, Russell Bunce, Eliphalet Terry, Seth Terry, Lynde Olmsted, Thomas Lloyd, James B. Hosmer, Joseph Trumbull, Samuel Tinker, Horace Burr, Russell Talcott, Christopher Colt, Eliphalet Averill, Nathaniel Patten, Joseph Welles, William Ely, Spencer Whiting, Barzillai Hudson, Jr., Jonathan Law, George Goodwin, Jr., Daniel Crowell, Charles Goodwin, Michael Shepherd, Caleb Goodwin, Dudley Buck, Aaron Chapin, Jared Scarborough, Barzillai Hudson, Jacob Sargeant, Peter Thacher, Talcott Wolcott, and Nathaniel Spencer.

Of these gentlemen, two became Governors of the State, and one its Chief Justice; while many of the others, who held no official position, are remembered as the most noted among the former citizens of this State for public spirit, integrity, and force of character.

With these were joined in the corporation, all subscribers to the fund—the payment of five dollars a year, or fifty dollars at once, constituting a member, one hundred dollars a Life Director, and two hundred dollars a Vice-President for life. There were in 1820, twelve Vice-Presidents and thirty-eight Directors for life by subscription,—and none of these survive.

Of the forty-nine corporators whose age we have been able to ascertain, seven were, in May 1816, under thirty, nineteen others were under forty, fifteen between forty and fifty, and eight over fifty years of age; and the average age of the forty-nine was 41.24 years.

It would hardly be possible in New England to-day to find among the active and responsible promoters of a new and most important corporation, one-seventh of the number under thirty years of age, and only seventeen per cent. above fifty years old, with a considerable numerical majority of the whole under forty. Whether this contrast indicates that men under thirty-five were comparatively of more esteem in

the community sixty-five years ago than they now are; or whether public opinion is more exacting now than then in demanding greater age and experience for positions of trust and responsibility, or whatever other deductions can be drawn from the circumstances, we consider the fact itself worthy of note.

Since the death of Mr. Hosmer nearly two years before, Mr. Beach had been the sole survivor of his original associates. He was elected a Director in 1830, and thus had been for over fifty years continuously, a member of this Board. He was punctual in his attendance until within the last few years, when his deafness, the only apparent infirmity of his old age, lessened his comfort in all social meetings. But to the last he manifested a constant interest in the Asylum, and attended a regular meeting of the Board about three months before his death.

A special meeting of the Directors was held July 13, 1880, immediately upon the death of Rev. John C. Bull, who had died the previous day, after a painful illness of several weeks' duration. Mr. Bull had been an instructor at the Asylum for nearly twenty-eight years, and had won the highest esteem of his pupils and associates by his pure life and faithful labors. Notices of him by those who best knew his worth, will be found on subsequent pages.

The death in May, 1880, of Mrs. Eliza Clerc, widow of our first instructor, Laurent Clerc, severs the last official tie between the Asylum and this accomplished family, who have been connected uninterruptedly with this institution from its beginning.

Mr. Henry Kennedy, who has filled most successfully the responsible position of Steward of the Asylum since April, 1865, fulfilling his duties with marked promptitude and efficiency, has resigned his office, and leaves us at the close of the school year. Mr. Wm. P. Williams of Bellows Falls, formerly of Hartford, has been appointed his successor.

The Secretary of the Corporation also retires after twenty-one years of service, and hopes that as pleasant and as long

a term may be the fortune of his successor, whose name will appear in the new roll of officers accompanying the printed report.

For the Board of Directors,

J. C. PARSONS, *Clerk.*

HARTFORD, April 23, 1881.

At the annual meeting of the Corporation, May 14, 1881, accepted, and ordered published.

J. C. PARSONS, *Secretary.*

REPORT OF THE PRINCIPAL.

TO THE BOARD OF DIRECTORS:

Gentlemen,—The whole number of pupils under instruction during the year has been 225. The number of pupils present May 1, 1880, was 190; 46 have been discharged; 32 new pupils have been admitted, and 3 former pupils readmitted, leaving 179 as the present attendance. Of this number 30 are from Maine; 17 from New Hampshire; 16 from Vermont; 61 from Massachusetts; 6 from Rhode Island; and 49 from Connecticut.

Of the ten boys who graduated from the first class last June, eight have secured steady employment with good wages, and two have entered the National Deaf-Mute College at Washington. At a little gathering of mutes in Boston, a few weeks ago, I met about twenty young men, who had left the Asylum within a few years, every one of whom was earning a comfortable support with every prospect of permanent employment.

Our graduates are to be found in all parts of New England, and, indeed, scattered all over the United States. With few exceptions they are honest, industrious, and respected citizens, earning a comfortable support for themselves and their families. They are engaged in a great variety of occupations, and in all of them take good rank as workmen.

The following letters relating to former pupils of this institution will show the estimation in which they are held by their employers:

THOMASTON, Conn., April 2, 1881.

*Job Williams, Principal American Asylum for the Deaf and Dumb,
Hartford, Conn.:*

DEAR SIR,—Your inquiry of March 31st, in reference to deaf-

mates in our employ, came to hand this day. In reply, I have to say, we have in our employ six—two as cabinet-makers, two turners, and two fitting clock parts. They are all fully up to the average of our employees; are as easily instructed as others; are generally very quick to apprehend any sign in reference to form or finish of work, and are attentive to business. Most of them have been in our employ for several years, which is sufficient guarantee that they have given us good satisfaction. They are frugal; have families to a considerable extent; lay up or save their earnings, and are esteemed as citizens.

Yours respectfully,

SETH THOMAS CLOCK CO.

OFFICE OF BARDWELL, ANDERSON & Co.,
Manufacturers of Tables and Desks,
BOSTON, April 5, 1881.

Mr. Job Williams, Hartford, Conn.:

SIR,—Your communication containing inquiry regarding the deaf-mutes who are in our employ is at hand. In reply I would say, that there are four of them. They are industrious, quick to learn, and capable workmen. We consider them among the most capable men that we employ.

Yours very truly,

BARDWELL, ANDERSON & CO.

OFFICE OF S. N. & C. RUSSELL,
Woolen Manufacturers,
PITTSFIELD, Mass., April 8, 1881.

Job Williams, Esq., American Asylum for Deaf and Dumb, Hartford, Conn.:

DEAR SIR.—In answer to your inquiry respecting the value as workmen of deaf-mutes, we would say, we have three in our employ—two young men, weavers, and one girl in our finishing department. The weavers fall a trifle short in quantity, but are fully up in quality of work to the average of the room. The girl is up to the average in every respect. We have no trouble in communicating with them, and they appear to communicate freely with their speaking associates. The Supt. and overseers say they would not hesitate to employ more. The weaver thinks there would be no objection to a large proportion—say one third—

mates in his department. One of your old pupils, Mr. B——, in the employ of the Boston & Albany Railroad here, is a very likely fellow, and I presume gives entire satisfaction. He delivers coal to the locomotives and keeps an account of it, working, I think alone, about half of each night.

Yours truly,

S. N. & C. RUSSELL.

Similar reports come to us from all parts of New England. These evidences of the thrift of our former pupils, largely due to the training received in our shops and the habits of industry there formed, are very gratifying.

The general health of the pupils throughout the year has been exceptionally good. There has been but one case of serious illness—a case of pneumonia—and in that the recovery was speedy and complete.

On the reassembling of the school after the summer vacation the pupils were saddened by the intelligence of the death of their little sunny-faced schoolmate, Philip Roach, who had been drowned on Sunday, August 22d, while bathing in the Thames river near his home in Norwich, Conn.

Once more we are called upon to record the loss of a valued instructor, thus making within a period of eight months the third break in the ranks of those who had served the Asylum as teachers for at least a quarter of a century. On the 12th of July last, after a painful illness of six weeks, Rev. John C. Bull, who for twenty-eight years had been a faithful and loved teacher in this Institution, was called to his reward. His patience and faithfulness and the loving sympathy of which he possessed a rare degree, were qualities eminently fitting him to win success in his chosen profession. In the prime of life and possessed of a strong constitution, we had looked forward to many years of service for him, rendered doubly valuable by his ripe experience, but the Master called him to other service. The influence of his pure character and consistent Christian life, will long live in many hearts. A more extended notice of Mr. Bull, as a teacher, will be found in another part of this report.

During the vacation of 1880, Dr. Avery, the regular physician of the Asylum, and Dr. Chamberlain, the Secretary of the State Board of Health, together made a very thorough examination of every part of our buildings and grounds, and recommended such changes and improvements in the sewerage and ventilation as the conditions for health seemed to them to require. Every recommendation thus made was carefully carried out. The change in the method of ventilating the chapel has been very apparent and has afforded great relief to all whose duty requires a daily attendance there. The effects of some of the other changes though less evident are no less beneficial.

To fill the vacancy in our corps of teachers caused by the death of Mr. Bull, the Institution was so fortunate as to secure the services of Dr. G. O. Fay, who had been connected with the Institution for the Deaf and Dumb at Columbus, O., for the last eighteen years, and for the last fourteen years had been its superintendent. By his energy, and under his skillful management that school had grown from one hundred and fifty to four hundred pupils, and its superintendent ranked second to none among the heads of similar institutions in this country. This Institution is to be congratulated on this valuable acquisition.

About the first of October Mr. Chas. L. Bartlett resigned his position as teacher, to accept a very flattering offer to engage in business. He had been with us less than a year, but had thrown himself so enthusiastically into his work that he gave promise of rare success. Our good wishes go with him into his new field of labor.

At the opening of the school year in September, a class of six pupils was selected for further experiment with the audiphone, care being taken to include only those who *seemed* to hear with it. After five months of daily practice with the instrument, we are convinced that it gives a little assistance in acquiring vowel sounds, but beyond that we are able to discover no advantage from it to our pupils.

The Fourth National Convention of Principals of Institutions for the Deaf and Dumb, met at the Clarke Institution at Northampton, May 25th-28th, 1880. The different meth-

ods of instruction, by signs, by articulation, and by the combined method, occupied much time in their discussion. The classes of the Clarke Institution went on regularly during the time that the convention was in session, and every opportunity was afforded to members of the convention to see the regular work of the school, and to ascertain for themselves the results which had been reached. If the working of the system of teaching by articulation, as practiced at the Clarke Institution, was not understood, it certainly was not the fault of the authorities there. The Institution is furnished with a large corps of experienced, enthusiastic, and accomplished teachers, and with every facility for securing the best results to be attained by their system. In the discussions of the convention, the articulation system and the combined system, as used by this and most of the similar institutions of this country, were each warmly advocated, the latter being strongly favored by a very large majority of the convention.

From the 6th to the 11th of September last, an International Convention of Teachers of Deaf-Mutes was held at Milan, Italy. As a majority of the members of the convention were Italians, and the schools for deaf-mutes in Italy are conducted on the articulation system, the subject of articulation naturally occupied a large share of the time and attention of the convention.

The prominence given to this subject in these two conventions, and the claims made for this method of instruction in the new phase which it has assumed, make it expedient for us to review, once more, the ground so often gone over in the past, and to examine the claims now put forward.

In the discussion we shall use the term, "Pure Oral System," being that adopted by the Milan convention to designate the articulation system, and the term American System, to designate that comprehensive system in general use in this country, where signs, the manual alphabet and writing are used as the means of instruction, and articulation and lip-reading are taught as accomplishments. That a certain portion of the deaf may be taught articulation, and through it receive an education is conceded by all. This portion includes the semi-

mutes and the *semi-deaf*, and exceptionally bright cases of total congenital deafness. These can be taught in this way, as they may soon acquire, if they do not already possess it on entering school, sufficient articulation and lip-reading to enable them to communicate with their instructors. There is another class, comprising a large proportion of deaf-mutes who never would attain facility in articulation and lip-reading. This class nearly all teachers of the deaf, including a large part of the most pronounced articulationists, admit can be better taught through the sign system. Concerning the most profitable way of instructing those occupying the middle ground between these two classes there is earnest dispute. It is conceded by most advocates of articulation, that the general education of this medium class can be carried on much more rapidly, and a broader development given, in the time allotted them at school, through the American system, than through the "pure oral" system, but they strenuously claim that the benefits of the articulation and lip-reading, which they acquire, more than compensate for the loss in general development. On the other hand, the advocates of the American system maintain that this medium class may carry on their general instruction by the sign system, and at the same time, under special teachers, acquire nearly as much of articulation and lip-reading, as they would if taught by the "pure oral" system. This is the theory and practice of this Institution.

Again, the advocates of the "pure oral" system almost invariably claim that the use of signs in the instruction of the deaf hinders their progress in the acquisition of language. They claim that the imperfections in the language of the pupils of the sign schools are caused by the habit of thinking in signs. But we find the same imperfections in the language of pupils who have been taught exclusively by articulation, and who, their teachers claim, have no knowledge of signs. Precisely the same kind of mistakes are made, also, by foreigners who attempt to write the English language before they have thoroughly mastered it. The following quotations will illustrate this point.

No. 1 is an extract from an imaginary story suggested by a picture which lay before the pupil while it was written. The writer lost hearing at the age of two and one-half years, and had been at school only where the use of signs was prohibited.

No. 2 is an extract from a letter written by a little Indian boy, at school at Carlisle Barracks, Penn.

No. 3 is an extract from a letter of a Japanese gentleman to a friend living in this city.

No. 4 is a letter written by a young Mexican, who is now attending a private school in this state.

No. 1.

A woman sat in the street, and some people want eat apples and we gave money to her about it. Two boys asked how much cost a apple. She said five cents. He don't pay it, and we walked all around in the street, and woman stay is too long time, because she is very tired, and two boys saw her sleeped, and he walked no noise thief and ran off. He are very bad boy because we thief apples to poor woman.

No. 2.

This is a very beautiful morning, because my heart is very cheerful now about something just a little talk to you again this time. * * * I want you answer back to me very well. I think to try. I want to please me every day. What you said them, I want hear them all you truth because good man every day. I very hard try read this time. * * * I was very excuse all the time at this Carlisle Children's School.

No. 3.

You will like not with a slightest doubt this kind walk should you be chanced to be in E—— during that time. But I must confess that I like better to enjoy with our little circle under the trees overhanging upon your house where we played many a time croquet, or anywhere we used to spend many hot summer eves to joyously on green grass, which rather difficult to get in E——, on account the stiffness of society in E——, or which is found should we go to the public places, parks, but very much unpleasant through mixing yourself with the commons who are rough and ignorant beyond expression.

No. 4.

N——, Conn., April 13th, 1881.

DEAR SIR:—Last vacation I had very pleasant time. I went to Hartford and spend day and a half. The time seemed to me very short indeed. I saw many thing that I never have seen them before. I came very happy from my trip. Next week I went to New York to see my friend, but I did not met him. I saw the Obelisk from far distance, because the policeman did not let us go near it. In the afternoon I started to Buffalo. Before I went to Buffalo, I went to Niagara Falls.

Yours truly,

J. M——.

How can these mistakes be accounted for? They surely cannot be attributed to signs. No; in all these cases the trouble comes simply and only from an imperfect knowledge of the English language. The remedy for these imperfections must be found in an increased familiarity with the language, and this familiarity must come through practice in the use of language. The pure oralists claim that their pupils get more practice in language than the pupils of the sign schools; but observation of the working of their system leads us to believe that this claim is unfounded. The method of communication is so much slower, and must be so much more individual in its working, that the pupils taught by the American system actually get much more practice in the use of the English language than the pupils taught by the "pure oral" system.

Signs are used by teachers only as a means of instruction—never as an end. The mastery of the English language is a chief end of the whole course. Written language and the manual alphabet, by which sentences are spelled out letter by letter in the same way as in writing, are used incessantly. Ideas must be acquired from the printed page, and acquired ideas must be expressed in written language. These two processes we crowd to the utmost of our ability.

Another evidence that the use of signs is no hindrance to the acquisition of written language is the fact that almost invariably the best language pupils are to be found among the best and clearest sign-makers. Before a thought can be clearly expressed, it must be clearly comprehended by the mind, and in no way can an idea be so quickly

and so clearly conveyed to the mind of an imperfectly educated mute as through signs. Again and again have we seen pupils, taught exclusively by articulation, where signs were forbidden, yet whose language was full of imperfections, rapidly improve in the correct use of written language when brought under instruction by signs.

But, say the pure oralists, suppose the progress is slow at first, the pupils taught by articulation soon attain such ready communication that they more than regain the time lost in the first steps. This theory is good. Would that facts sustained the theory! But with a large majority of the pupils in articulation schools *ready* communication is not reached. It is labored and slow and uncertain to the end of the course, and they leave school with a little articulation and some ability to read on the lips, but with much less general education and mental development, and so are far less fitted for the practical duties of life than those who have been under instruction for the same length of time by the American system.

Again, it is claimed that the pure oral method restores mutes to society by giving them the same means of communication as is in general use by the community about them. This theory is also good, but is sustained by facts only in a small minority of cases. *Some* of the pupils taught by the pure oral system do acquire the ability to communicate readily by articulation and lip-reading. So also do *some* of those taught by the American system acquire the same ability. In both cases they are the exceptions and not the rule.

Pupils taught by the "pure oral" method neither understand books better nor use language with more facility, or accuracy, than pupils of the same average ability, taught by the American system for the same length of time. In fact, so far as our observation goes, the former are quite behind the latter in these respects.

Both classes of schools have pupils who have learned language through the ear. They are either partially deaf now, or acquired language before losing their hearing. These use language readily either in reading or in writing. They form an entirely different class of pupils from the toto-congenital

mutes, and they have nearly as much advantage over the latter as pupils possessing all their faculties have over semi-mutes. They occupy a medium ground between the two other classes. They cannot be measured by the same gauge. They start on their school course under very different conditions. In the acquisition of language the toto-congenital mute is heavily weighted in the race with his semi-mute school-mate. Whatever the system of instruction, this wide difference cannot be overcome. To judge fairly of the merits of productions of pupils this difference of conditions must always be taken into consideration. That, which in the one case would deserve the highest praise, would merit very little in the other.

Among pupils possessing all their faculties are always to be found a certain proportion who never attain to respectable scholarship. Among deaf mutes this proportion is greater than among hearing children, the minds of some of them having been affected by the same disease which deprived them of their hearing. Many of these are never able to surmount the difficulties in the acquisition of the English language, which stand in their way, and, consequently, in all schools for the deaf we find numerous "murders of the King's English," and the sin can be attributed to no system of instruction, but is due to unalterable conditions imposed by Providence.

It seems to be taken for granted in some quarters that children taught by the sign method have no means of communication except by signs. Again and again we have heard it said that such pupils have no means of communication with their friends and cannot enjoy ordinary social intercourse. This is an entirely mistaken idea. The only method of communication of which they are deprived is that of speech, (a great deprivation it is true) but every other mode of communication is open to them. The eye speaks; the hand speaks; pencil and slate or paper are used with the utmost facility; and of many a social circle an intelligent mute is the most attractive member.

Once more, there is in some quarters an unreasonable skepticism as to whether pupils understand thoroughly the ideas

which they translate from signs into written language. If an incident were related, or a story told, in French to a class of hearing children and immediately reproduced in good English, would there be any reasonable doubt that the ideas were thoroughly comprehended? There is even less room for doubt in regard to a translation from signs. The surest test of the grasp of thought is the ability to express that thought clearly in written language.

For an illustration of the power of signs to convey thought clearly, perfectly independently of written or spoken language, I would refer to the translations printed in the appendix to this report. Classes of various grades from one year to seven years standing were assembled in the chapel; all witnessed the same telling of the story in signs by the principal, and no other assistance was allowed the pupils. How much each understood and the ability of each to express ideas in language will appear from an inspection of the various versions of the story.

The method of instruction generally employed in the institutions for the deaf and dumb in the United States, (about 5,600 out of 6,000 pupils being taught by that method), is a broad and comprehensive one, wrought out through long years of experience by such men as Rev. Thomas H. Gallaudet, Mr. Lewis Weld, Rev. W. W. Turner, Drs. H. P. Peet, F. A. P. Barnard, A. L. Chapin, and a host of faithful co-laborers, men able and candid, ever ready to examine new means and methods, and to adopt whatever can be shown to be an improvement, but having too conscientious a regard for the real interest of their pupils to yield their earnest convictions to any mistaken ideas of parents or friends, or to the theories of philanthropists, well-meaning, indeed, but misled by an imperfect or superficial knowledge of facts. Its advocates do not claim that it is a *perfect* system, but they do not claim that for the instruction of the great mass of deaf mutes, it is the best system yet devised. When a better way can be demonstrated, they will gladly adopt it.

Respectfully submitted,

JOB WILLIAMS, *Principal.*

HARTFORD, April 23, 1881.

PHYSICIAN'S REPORT.

To the Directors of the American Asylum :

GENTLEMEN, I hereby submit my annual report of such cases as have come under my professional care during the past year. It is a matter for devout thankfulness that we have been spared from loss by death among the inmates of the Asylum.

The new pupils have been vaccinated, and proper efforts made to maintain the vigor and health of the children who are committed to our care.

Enclosed please find a list of cases which I have treated during the past year.

CASES.					RECOVERED.
2	Abscesses,	-	-	-	2
3	Bronchitis,	-	-	-	3
1	Disease of the heart,	-	-	-	1
2	Disease of the eye,	-	-	-	2
2	Pneumonia,	-	-	-	2
<hr/>					<hr/>
10					10

Respectfully submitted,

GEO. W. AVERY, M D.

HARTFORD, CONN., April 22, 1881.

APPENDIX.

[From the American Annals for the Deaf and Dumb, October, 1881.]

JOHN CATLIN BULL.

BY, REV WILLIAM B. CLARKE, GRISWOLD, CONN.

* * * * * Graduating from college with honor, Mr. Bull spent a year in teaching, after which he entered the Theological Seminary at Yale. This was in the fall of 1850. I shall not dwell at length upon the seminary course, more especially as the associations were largely those of the college continued. This, I am sure, was no matter of regret to him, but rightly of congratulation. He was one whom an old influence deepened could benefit more than a new one gained.

At the end of his second year in the Seminary, and very soon after he was licensed to preach, the position opened to him of teacher in the deaf-mute institution at Hartford. This position he thought it best to accept, as it would afford him a steady income,—a matter, as it happened, of considerable consequence to him at that time,—and would not prevent his finally choosing the ministerial life should he prefer it.

It has always seemed to me that this event was a true call of God to my dear friend, and the work it opened to him his divinely-appointed calling. To him, as to every true soul, the first question was, What best, most useful service in this world of men is there for me to do? and the work among the deaf-mutes, as he became familiar with it, justly enlisted the love and reverence of his spirit. What walk could be closer in the footsteps of the Lord from heaven, or more entirely obedient to his commands than this? Here, literally, were the hungry to feed and the naked to clothe, for a principal object of the work was to enable otherwise dependent ones to earn their own support; here were souls shut up in prison whose prison doors were to be opened.

There was another respect in which the position in Hartford was well suited to Mr. Bull. He was capable, above most, of bestowing a tender and gentle sympathy, and it was true of him, also, that beyond most he needed sympathy. He was not such an one as the Lord would choose to send alone on missionary work to the heathen; he wanted, as he was also able to win, the support of loving hearts, and it was in part, I believe, because this need of his spirit was to be so well met in Hartford that the Lord in his love sent him there.

It has ever been the honorable custom of our deaf-mute institutions of

the higher class to seek educated and able as well as Christian men for their teachers. The corps of instructors at Hartford might rank at the time spoken of with the faculty of one of our New England colleges for eminent intellectual and social qualities. This agreed well with the warm heart of our friend; it suited his refined taste, and it afforded him the needed support in his work. The problem how to impart instruction to minds capable only of so partial an illumination is a difficult and trying one, but a dignity was imparted to it—it got a certain brightness, even—from the fact that cultivated and bright minds were giving their best thought and skill to its solution. I can imagine that Mr. Bull entered into these circumstances with a genial interest. His spirit was not sluggish; on the contrary, it was one of marked activity. But because he was pervaded, beyond what is often seen among men, with modesty, he was little fitted—I should say he was unfitted—for any sphere of active rivalry; and yet he was one to make himself at home, and very much at home, in the more friendly competition, if so it may be called (competition where competition there was none), of the Asylum. The whole business, so necessary there, of comparing methods, of contriving new expedients, and improving on the expedients of others,—in a word, as St. Paul has it, of “considering one another to be provoked unto good works,”—all this would suit him well.

The more important question remains, What were the traits of mind and character that Mr. Bull brought to the business of deaf-mute instruction, and what fitness did they impart for the work?

Aside from his modesty of which I have spoken, and which in him was peculiarly a mental characteristic, he had four very marked traits.

The first of these was *fidelity*. He was thoroughly grounded in principle, and it was not in him to be otherwise than faithful to any trust committed to him, especially one as sacred as that of teacher in a deaf-mute institution.

The second was a certain *patience or evenness of mind*. I know not how exactly to describe it. But it was noticeable, and impressed those who became intimately acquainted with him. His pastor, the Rev. Dr. N. J. Burton, in the memorial sermon preached the Sunday morning after his death, felicitously speaks of this trait as “a steadfast quietness and peaceableness of mind.” What this must have been in a school-room is clear of itself.

The third was *purity of motive*. Dr. Burton, in the same discourse, says of him: He had “a thorough-going and fastidious purity,—purity of thought, purity of intention, purity of feeling. His conversation was clean. His humor was clean. His allusions were sweet and refined. His books were clean and strengthening. He had no equivocal companionships.”

This is all true. His purity did have that breadth and completeness; it pervaded him. But its central and remarkable feature was that which

I have mentioned: a single-minded man, beyond most of us in this world; one whose motive, in whatever he did, was the motive proper to that act, without selfish mixture or false mixture of any sort. For my own part, if I were to have the making of an atmosphere for young minds to live in, I should put in this element as first of all important.

The fourth was *sympathy*. This also he had in a very unusual degree. His heart was alive with it, ready to bestow on all who stood in near relation to him. I should think no pupil could have failed to find this out. Since I have been writing these words of my friend, there has come to my door a poor man from a neighboring town, who has three deaf and dumb children that have been educated at Hartford. "I hear," he said to me, "that one of the chief teachers at Hartford has died." "Yes," I responded. "My children tell me," added the old man, "that he cared for the scholars more than most teachers do." How many are the testimonies like this that have followed him into the upper presence!

These, if I have judged my friend correctly, were the marked qualities of his character. They are not of the forceful and energetic kind; they do not shine afar, commanding notice; they do not impress themselves, in an active way, on the minds of men at large; but they have *quality* beyond most qualities—they are fine and strong. These were united in him with clearness, honesty, and breadth of mind; and the whole was attempered by a superior education and the long-continued control of religious principle.

This is what I know of the elements of fitness in my friend for the position of a teacher. What his success was, it is not for me to judge; but I am permitted to give the following estimate of his work by Professor R. S. Storrs, instructor in the American Asylum, who writes from the intimacy of twenty-seven years of associated service:

"Mr. Bull entered upon his work as teacher at the Asylum in the autumn of 1852, only one year before myself, and his first year of professional life coincided in date with the twenty-third and last year of the principalship of Mr. Weld, the immediate successor of Dr. T. H. Gallaudet in that office. Mr. Bull always accounted himself fortunate in having received his earliest instruction and impulse as a teacher from such a man as Mr. Weld, whose conscientious devotion to his work, and energetic supervision of its details, are yet a wholesome tradition in the Asylum. Though Mr. Weld was at this time greatly enfeebled by the disease which so soon terminated his life, and was absent a part of the year from the Institution, yet the impress of this early contact of Mr. Bull's professional life with his was evident in all its subsequent course.

"The life of a teacher, and especially a teacher of deaf-mutes, usually offers few salient points by which to describe it. It resembles rather the steady and beneficent outflow of some living spring, ministering continuous health and happiness to those who drink of it, than those more intermittent and powerful energies of nature whose sudden sur-

prises are easily noted and chronicled. Mr. Bull's own nature and temperament, too, were not such as to drive him into eccentric orbits of independent and erratic action. His life resembled rather the regular and restrained revolution of the planet, ever obedient to its own centripetal law—conspicuously in his own case, *the law of love*.

“So homogeneous was Mr. Bull's whole life, and so simple and sincere his nature, that any analysis of his professional as distinguished from his general life seems hardly necessary. As in the family and among his friends the repose of all hearts in the fineness and fidelity of his love was most absolute, so in his class-room he was singularly kind, patient, and sympathetic, embracing every weakest and most wayward pupil in his loving solicitude. As in any most cultivated circle the delicacy and refinement of his literary taste and the range and accuracy of his culture were easily recognizable, so in his class-room he was never content with bare routine work, however earnest and exact, but endeavored always to infuse into his class something of that wider curiosity and culture which marks the true scholar. As in the vicissitudes of a domestic life more than usually marked by changes he adapted himself to each with surprising readiness and flexibility, so was he in his class-room always ingenious and apt in his approaches to the imprisoned minds around him. And, finally, as a most modest but sincere Christian sentiment pervaded his whole daily life, so was the same spirit equally manifest to his associates and his pupils, alike in chapel and in class-room, and wherever he was seen. In all essential respects, indeed, of bodily, mental, and spiritual endowment, Mr. Bull was so evidently and amply furnished for his difficult yet delightful work, that wherever, within its range of acquaintance, the fine aroma of his mingled modesty and merit *could* be appreciated, there was he honored and loved, even as in the interior circles of his domestic and social life.

“In January of 1867, Mr. Bull took charge of the Gallaudet Scientific School connected with the Asylum—upon Mr. Storrs' retirement from it on account of impaired health—and continued in charge of it until its final discontinuance in 1877, when he resumed his former relation to the Institution as a regular teacher. The reasons for this discontinuance were fully given in the Asylum Report for 1878, and in their light Mr. Bull's own cordial advocacy of the step even enhances our respect for him as a teacher and a man. A strong distaste for mere gloss and veneer in all educational processes would be a necessary inference from the genuineness of Mr. Bull's own character and culture. When, therefore, experience had fully demonstrated to him, as to his associates, that the inevitable tendency of this distinct organization of even the most advanced of our comparatively immature pupils under this high-sounding designation was prematurely to awaken their ambition for equally high-sounding studies, and to discontent them with needed prolonged drill upon elementary branches, and that more useful work could be

done for the same pupils under a less ambitious class designation, his own acceptance and advocacy of the proposed change was thereby assured. I may add that the advantage of this seemingly retrograde step in its connection with the attendant reorganization and real advancement of our regular course was a matter of increasing satisfaction to Mr. Bull from the date of its occurrence until his death.

"I will mention only one other of Mr. Bull's professional characteristics, by which, however, the insight and independence of his judgment was especially manifested. I refer to his high estimate of the *teacher's* privilege and position as compared with any other opportunity of service for those to whom his life was devoted. This characteristic finds its obvious attestation in the mere fact that he remained a teacher—or, as some might superficially put it, *only* a teacher—until his death. To Mr. Bull, as to his associate teachers at the oldest among American deaf-mute institutions, there came, during his long term of service, frequent opportunities for exchanging his position as teacher for that of principal. It was to him as if the pastor, charged with the sweetest and most sacred of human responsibilities, should voluntarily abandon them for the mere 'serving of tables.' That harassing 'superintendence of cares' which constitutes the chief duty of the principals of most of our larger deaf-mute boarding schools, unrelieved by any considerable quickening contact with the mental and moral life of the pupils, had no attraction for Mr. Bull, as compared with the inspiring opportunity of the earnest and enthusiastic teacher. For him there was no dearer and no higher position within his chosen profession than that of *teacher*; and it is peculiarly fitting that the teacher's chair left vacant by one so appreciative of its privilege should now in turn be sought by one of our ablest and most successful principals—himself voluntarily turning from the charge of mere temporalities to the higher and more unhindered service of mind and heart.

"There is an oriental apologue relating the wonder of the happy dead, ranging the Elysian fields, at the peculiar honor with which a modest stranger from our earthly sphere was welcomed among them. To their eager inquiries what had been the peculiar splendor and renown of his earthly service he only replied, 'I was a teacher of little children.' If such could be the conception of even pre-Christian culture, with how much clearer confidence may we anticipate for our departed friend the ineffable welcome of Him who took a little child and set him in the midst of them, and when He had taken him in His arms, said unto them, 'Whosoever shall receive one of such children in my name receiveth me.'" * * * *

Dr. AMERICAN ASYLUM, IN ACCOUNT WITH ROLAND MATHER, Treasurer. Cr.

1881. April 8.	To paid orders of Directing Committee in favor of Henry Kennedy, Steward, the year past,.....	\$20,000.00	1880. April 8.	By Balance per Account of this date,....	\$12,459.81
	To paid Salaries, the year past,.....	23,831.29	1881. April 8.	“ Rents, the year past,.....	575.00
	“ Insurance, “	982.50		“ Pay Pupils,.....	346.25
	“ Sundry expenses,.....	1,037.42		“ Receipts from the six New England States for board and tuition of Beneficiaries,.....	32,900.00
	“ Taxes,.....	127.85		“ Income from the Fund,.....	16,300.41
	“ the Steward, amt. of Clothing bills collected of the States,....	1,249.08		“ Clothing bills collected from the States for the Steward,.....	1,249.08
	“ Re-investments, “Fund Acct.,”.	34,962.50		“ Bonds paid “Fund Account,”	20,625.00
	Cash on hand,.....	2,264.91			
					\$84,455.55

We have this day examined the vouchers for the disbursements in this account, also the vouchers for the securities owned by the American Asylum, as per inventory of the Treasurer, and find them to agree with the same.

HARTFORD, April 18, 1881. [Signed], JOHN C. DAY, } Auditors.
WM. M. HUDSON, }

STATEMENT

OF THE

FUND OF THE AMERICAN ASYLUM.

Invested in National Bank Stocks in Conn., -	\$83,700.00
Invested in Railroad Bonds, - - -	80,078.75
Invested in Bonds and Mortgages of Real Estate, - - - - -	48,375.00
Invested in Railroad Stock, - - -	15,812.50
Invested in Real Estate in Chicago, - -	27,000.00
Invested in Real Estate in Hartford, - -	98,000.00
Furniture in the Institution, - - -	5,390.00
Cash on hand, - - - - -	2,264.91
	<hr/>
	\$360,621.16
Deduct "Blodget Fund," - - -	2,233.00
	<hr/>
	\$358,388.16

HARTFORD, April 8, 1881.

ABSTRACT OF

DR.

AMERICAN ASYLUM *in account with* HENRY KENNEDY,

To Flour,	-	-	-	-	\$1,301.52
Meal,	-	-	-	-	14.42
Cakes and Crackers,	-	-	-	-	59.79
Rice and Corn Starch,	-	-	-	-	34.30
Yeast,	-	-	-	-	89.43
Hay and Straw,	-	-	-	-	203.49
Provender and Oats,	-	-	-	-	324.25
Tools and Blacksmithing,	-	-	-	-	82.18
Butter,	-	-	-	-	2,114.15
Eggs,	-	-	-	-	8.84
Charcoal,	-	-	-	-	207.22
Hard Coal,	-	-	-	-	2,461.27
Wood,	-	-	-	-	5.81
Furniture,	-	-	-	-	841.00
Groceries,	-	-	-	-	1,428.71
Light and Gas,	-	-	-	-	930.00
Meat, Fish, and Fowl,	-	-	-	-	2,909.56
Medicine,	-	-	-	-	86.05
Miscellaneous,	-	-	-	-	488.99
Pupils,	-	-	-	-	868.43
Repairs and Improvements,	-	-	-	-	2,435.00
Schools and Postage,	-	-	-	-	106.25
Cabinet Shop,	-	-	-	-	894.88
Shoe “	-	-	-	-	966.24
Tailor “	-	-	-	-	483.77
Vegetables and Fruit,	-	-	-	-	671.38
Wages,	-	-	-	-	4,235.96
Washing and Soap,	-	-	-	-	883.65
Water Works,	-	-	-	-	414.00
					<hr/> 25,550.54
Balance to credit of new account,	-	-	-	-	1,569.69
					\$27,120.23

CURRENT EXPENSES.

Steward, for the year ending April 1, 1881.

CR.

By Balance from Last Account, .	-	-	\$1,710.03
Cash from Treasurer, .	-	-	20,000.00
“ “ Pupils for clothing, traveling ex-			
penses, etc.,	-	-	629.51
“ “ State of Connecticut for ditto, .	-		191.84
“ “ “ Maine “	-		227.80
“ “ “ N. Hampshire “	-		142.65
“ “ “ Vermont “	-		76.79
“ “ “ Massachusetts “	-		581.90
“ “ “ Rhode Island “	-		28.10
“ “ Cabinet Shop, .	-	-	1,402.69
“ “ Shoe Shop, .	-	-	801.33
“ “ Sale of Live Stock, .	-	-	290.48
“ “ Miscellaneous sources, including sale			
of surplus stores, pasturage, items			
of rents, etc.,	-	-	1,037.11

\$27,120.23

IV. PAPERS, PERIODICALS, ETC.

THE FOLLOWING PAPERS HAVE BEEN SENT TO THE PUPILS GRATUITOUSLY THE
PAST YEAR.

NAME.	WHERE PUBLISHED.	
Athol Transcript,	Weekly,	Athol, Mass.
Anamosa Eureka,	"	Anamosa, Iowa.
Boston Transcript,	"	Boston, Mass.
Canaan Reporter,	"	East Canaan, N. H.
Christian Secretary,	"	Hartford, Conn.
Columbian Register,	"	New Haven, Conn.
Commercial Advertiser,	"	New York.
Connecticut Courant,	"	Hartford, Conn.
Connecticut Herald and Journal,	"	New Haven, Conn.
Deaf Mute Journal,	"	New York City.
Deaf Mute Index,	" In. for D. & D.,	Colorado Springs, Col.
Deaf Mute Mirror (two copies),	"	Inst. for D. & D., Flint, Mich.
Deaf Mute Record (two copies),	"	Inst. for D. & D., Fulton, Mo.
Gazette,	"	Lewiston, Me.
Goodson Gazette,	"	Inst. for D. & D., Staunton, Va.
Hartford Courant,	Daily,	Hartford, Conn.
Hartford Post,	"	" "
Hartford Times,	"	" "
Kansas Star,	Weekly,	In. for D. & D., Olathe, Kansas.
Kennebec Journal,	"	Augusta, Me.
Kentucky Deaf Mute (two copies),	"	Inst. for D. & D., Danville, Ky.
Lantern,	"	New York City.
Modern Times,	"	Inst. for D. & D., Delavan, Wis.
Mutes' Chronicle (four copies),	"	Inst. for D. & D., Columbus, O.
Mutes' Companion (four copies),	"	Inst. for D. & D., Fairbault, Minn.
Mute Journal of Nebraska,	Monthly,	Inst. for D. & D., Omaha, Neb.
Nashua Telegraph,	Weekly,	Nashua, N. H.
New Haven Palladium,	"	New Haven, Conn.
Our Dumb Animals,	Monthly,	Boston, Mass.
Religious Herald,	Weekly,	Hartford, Conn.
Republican Standard,	"	Bridgeport, Conn.
Rhode Island Country Journal,	"	Providence, R. I.
Rhode Island Press,	"	" "
Salem Register,	Semi-weekly,	Salem, Mass.
Silent Observer,	Weekly,	In. for D. & D., Knoxville, Tenn.
Texas Mute Ranger,	Monthly,	Inst. for D. & D., Austin, Texas.
Vermont Christian Messenger,	Weekly,	Montpelier, Vt.
Vermont Watchman and State Journal,	"	" "
Villager,	"	Amesbury and Salisbury, Mass.
West Virginia Tablet,	"	Inst. for D. & D., Romney, W. Va.
Zion's Herald,	"	Boston, Mass.

V.

LIST OF PUPILS

IN THE SCHOOL WITHIN THE YEAR ENDING ON THE 1ST OF MAY, 1880.

MALES.

NAME.	RESIDENCE.	ADMISSION.
Abrams, George,.....	Birmingham, Conn.,.....	Sept., 1872
Acheson, Eugene A.,....	Boston, Mass.,.....	Sept., 1878
Axt, George J.,.....	New Haven, Conn.,.....	Sept., 1876
*Babbitt, Henry E.,....	North Dighton, Mass.,....	Sept., 1877
Ball, Frank O.,.....	Mapleton, Maine,.....	Sept., '75 & '78
Barton, Amos,.....	Benton, Maine,.....	Sept., 1874
Bayless, Thomas B.,....	Bridgeport, Conn.,.....	Sept., 1876
Beaucage, John,.....	Baltic, Conn.,.....	Oct., 1877
Bishop, George R.,....	South Boston, Mass.,....	Sept., 1880
Brazell, Patrick J.,....	Lynn, Mass.,.....	Sept., 1876
*Brown, Frank J.,.....	Greene, R. I.,.....	Sept., '71 & '78
*Brown, Hiram F.,....	Rock Bottom, Mass.,....	Sept., 1873
Brown, Isaac A.,.....	Rockland, Maine,.....	Sept., 1878
*Brown, Marcus M.,....	Rock Bottom, Mass.,....	Sept., 1873
Brush, Charles S.,.....	Boston, Mass.,.....	Sept., 1877
Bulkley, Robert R.,....	Wethersfield, Conn.,.....	Sept., 1875
Bryne, Michael,.....	Fall River, Mass.,.....	Sept., 1879
Changnon, George F.,..	Chicopee Falls, Mass.,....	Sept., 1876
Changnon, Joseph H.,..	Chicopee Falls, Mass.,....	Sept., 1876
Clarkson, Charles H.,..	Worcester, Mass.,.....	Sept., 1875
Clifford, John,.....	Fitchburgh, Mass.,.....	Oct., 1877
Clough, Charles T.,....	Ashland, N. H.,.....	Sept., 1878
*Comstock, John S.,...	Norwich, Conn.,.....	Sept., 1873
Conant, Frank A.,.....	New Haven, Conn.,.....	Sept., 1880
*Cook, Edwin W.,.....	Provincetown, Mass.,....	Sept., 1873
Creamer, Pelham S.,...	So. Waldoboro, Maine,...	Sept., 1880

NAME.	RESIDENCE.	ADMISSION.
*Cross, Willie,	Grafton, N. H.,	Sept., 1873
DeLaite, George R.,	Easton, Maine,	Oct., 1877
† Doherty, John,	Manchester, N. H.,	Sept., 1877
Doying, Charles E.,	Rockville, Conn.,	Sept., 1876
Dresser, Edward L.,	Turner Village, Maine,	Sept., 1874
Eaton, Archie B.,	East Weare, N. H.,	Sept., 1879
Edberg, Gustav,	No. Easton, Mass.,	Sept., 1879
Eddy, George W.,	New Britain, Conn.,	Sept., 1876
Eddy, Walter A.,	Chepachet, R. I.,	Sept., 1873
*Ellis, David E.,	Keene, N. H.,	Oct., 1874
Ely, Willie,	Haddam, Conn.,	Sept., 1874
Falvey, Dennis,	Marlboro, Mass.,	Sept., 1876
*Farnham, Charles H.,	Boothby, Maine,	Sept., '70 & '79
Fenaghtie, Patrick,	Boston, Mass.,	Sept., 1876
*Ferris, Frank,	Greenwich, Conn.,	Oct., 1880
Flynn, John F.,	Bangor, Maine,	Oct., 1877
*French, Edwin H.,	Antrim, N. H.,	Sept., 1873
Furrow, Arthur,	Agawam, Mass.,	Sept., 1879
Goulding, William,	Lynn, Mass.,	Sept., 1876
Griffin, James,	Boston, Mass.,	Sept., 1880
Greenough, Frederick,	St. Albans, Vt.,	Sept., 1876
Gunnison, Fred. A.,	Topsfield, Mass.,	Sept., 1878
Guyott, Edward W.,	Holyoke, Mass.,	Sept., 1880
Hagerty, Joseph D.,	Hartford, Conn.,	Sept., '71 & '79
Halpin, William,	New Haven, Conn.,	Sept., 1873
Harney, John,	Middletown, Conn.,	Sept., 1876
Hawes, George B.,	Emden, Maine,	Sept., 1880
Hill, Elmer E.,	Starksboro, Vt.,	Sept., 1876
Holland, Fred. H.,	Waterbury, Conn.,	Sept., 1874
Horgan, Timothy,	East Cambridge, Mass.,	Sept., 1879
Johnson, Arthur S.,	Jewett City, Conn.,	Sept., 1872
Kearns, Jeremiah,	Manchester, N. H.,	Sept., 1877
Kelly, Willie F.,	Ansonia, Conn.,	Sept., 1878
Kennedy, Eddie,	Middletown, Conn.,	Sept., 1876
Lamothe, Nazaire,	Southbridge, Mass.,	Oct., 1877
Lamothe, Pierre,	Southbridge, Mass.,	Oct., 1877
Lane, William H.,	Fall River, Mass.,	Sept., 1877
*Lannon, James,	West Roxbury, Mass.,	Sept., 1876

NAME.	RESIDENCE.	ADMISSION.
Laverdière, Louis P.,	Southbridge, Mass.,	Sept., 1880
*Lewis, Edward O.,	W. Mills, Industry, Me.,	Sept., 1873
Long, Thomas,	Boston, Mass.,	Sept., 1876
Lounsbury, Theodore I.,	Stamford, Conn.,	Sept., 1874
Maher, Frederick J.,	New Haven, Conn.,	Sept., 1880
Malone, Charles,	Fall River, Mass.,	Sept., 1876
Marshall, Gilbert F.,	Bridgeport, Conn.,	Sept., 1879
*Maxam, Willard C.,	Swansey Village, Mass.,	Sept., 1879
McCrate, Daniel,	Whitinsville, Mass.,	Sept., 1878
McCue, Patrick F.,	Hartford, Conn.,	Oct., 1878
McGinn, James E.,	Providence, R. I.,	Sept., 1874
McIntyre, Ernest,	Warren, Maine,	Sept., 1880
*Metrash, Robert L. G.,	Norwalk, Conn.,	Sept., 1872
*Millard, Francis W.,	Palmer, Mass.,	Sept., 1874
Mooers, Willie O.,	Milo, Maine,	Sept., 1877
†Morgan, Arthur,	Gorham, N. H.,	Feb., 1877
Mullen, Martin B.,	Boston, Mass.,	Sept., 1875
Mullen, Patrick J.,	Boston, Mass.,	Sept., 1875
O'Brien, James O.,	Fall River, Mass.,	Sept., 1879
*O'Connell, Thomas,	New Britain, Conn.,	Sept., 1878
O'Connor, Thomas,	South Newmarket, N. H.,	Sept., 1877
*Orcutt, Alvah W.,	Dedham, Mass.,	Sept., 1878
Page, Joseph W.,	Burlington, Maine,	May, 1874
Page, Edmund,	Burlington, Maine,	Sept., 1880
Parker, Frank S.,	Farmington, N. H.,	Sept., 1874
Paro, Clefos,	Lebanon, N. H.,	Sept., 1880
Penny, Franklin E.,	Knox, Maine,	Sept., 1878
Perry, Edgar W.,	Pittsburg, N. H.,	Sept., 1880
Porter, Amai,	Spencer Depot, Mass.,	Sept., 1876
*Randall, Edwin,	North Harpswell, Maine,	Dec., 1873
Rathbun, Ira S.,	New Bedford, Mass.,	Jan., 1879
Richards, Hermon L.,	Westport, Conn.,	Sept., 1879
Richmond, George,	Voluntown, Conn.,	Sept., 1876
Riggs, Charles A.,	North Leeds, Maine,	Sept., 1878
†Roach, Philip,	Norwich Town, Conn.,	Sept., 1875
Roberts, John,	Boston, Mass.,	Sept., 1877
Roberts, Frederick,	Boston, Mass.,	Oct., 1880
Robinson, George H.,	Concord, N. H.,	Sept., 1878

NAME.	RESIDENCE.	ADMISSION.
Rock, Arthur,.....	Salem, Vt.,.....	Sept., 1880
Rutter, Elwyn S.,.....	Washington, Vt.,.....	Sept., 1876
Saleski, Anton,.....	Meriden, Conn.,.....	Sept., 1878
Sanborn, Warren,.....	East Jackson, Maine,....	Sept., 1880
*Schortmann, Richard,..	Broad Brook, Conn.,....	Sept., 1873
Shea, Daniel,.....	Rockland, Mass.,.....	Sept., 1877
Shea, John,.....	Rockland, Mass.,.....	Sept., 1878
Shiatte, Frederick,.....	Manchester, N. H.,.....	Sept., 1878
Simonds, Adelbert J.,....	South Strafford, Vt.,....	Sept., 1880
Skillin, Fred. G.,.....	Boston, Mass.,.....	Sept., 1878
*Small, Edwin W.,.....	H'rtl'nd Four Corners, Vt.	Sept., 1873
*Small, Simeon B.,.....	H'rtl'nd Four Corners, Vt.	Sept., 1873
Snyder, Lawrence M.,....	New Haven, Conn.,.....	Sept., 1878
Spear, Charles F.,... ..	Belfast, Maine,.....	Sept., '78 & '80
St. John, Arthur,.....	Fall River, Mass.,.....	Sept., 1880
Stover, Frederick,.....	West Appleton, Maine,..	Sept., 1874
Sullivan, Roger,.....	Manchester, N. H.,.....	Oct., 1877
Sullivan, James C.,.....	Weston, Mass.,.....	Sept., 1880
Taylor, Dana B.,.....	Wells, Maine,.....	Sept., 1878
Thayer, Henry E.,.....	H'rtl'nd Four Corners, Vt.	Sept., 1879
Tiernen, John,.....	New Haven, Conn.,.....	Sept., 1879
Trainer, John,.....	Providence, R. I.,.....	Sept., 1876
*Tripp, George E.,.....	Boston, Mass.,.....	Nov., 1880
Varney, Fred. L.,.....	Farmington, N. H.,.....	Sept., 1875
*Verry, Alvin F. M., ...	Fall River, Mass.,.....	Sept., 1874
Walker, Chas. R.,.....	Holyoke, Mass.,.....	Sept., 1879
Walsh, Michael F.,.....	Wolcott, Conn.,.....	Sept., 1879
Ward, Willie,.....	Holyoke, Mass.,.....	Sept., 1878
Wells, George,.....	Bridgeport, Conn.,.....	Sept., 1874
*White, Pitt O.,.....	Lime Rock, Conn.,.....	March, 1880
White, William H.,.....	Pittsfield, Mass.,.....	Jan., 1877
*Williams, Frank D.,....	Haverhill, Mass.,.....	Sept., 1873
Williams, George C.,....	West Haven, Conn.,....	Sept., 1880
Wise, James H.,.....	Cambridgeport, Mass.,..	Sept., 1877
Worcester, Ira E.,.....	Amherst, N. H.,.....	Sept., 1879

F E M A L E S .

NAME.	RESIDENCE.	ADMISSION.
Acheson, Pauline M.,....	Boston, Mass.....	Sept., 1878
Atkinson, Mary E.,.....	New Britain, Conn.....	Sept., 1875
Baldwin, Harriet,.....	New Haven, Conn.....	Sept., 1875
Bassett, Ida,.....	Pittsford, Vt.,.....	Nov., 1875
Bates, Beula E.,.....	Guilford, Vt.,.....	Sept., 1876
*Benson, Margaret J.,...	Boston, Mass.,.....	Feb., 1879
Bigelow, Flora B.,.....	Webster, Mass.,.....	Sept., 1875
Bronson, Isabelle E.,....	Plainville, Conn.,.....	Sept., 1880
Buck, Lucy E.,.....	Voluntown, Conn.,.....	Sept., 1875
Burke, Lena,.....	New Haven, Conn.,.....	Sept., 1879
Burniston, Margaret B.,..	Greeneville, Conn.,.....	Sept., 1875
*Case, Lillie A.,.....	Avon, Conn.,.....	Sept., '67 & '75
*Changnon, Mary,.....	Chicopee Falls, Mass.,..	Sept., 1878
Charlesworth, Mary A.,..	Holyoke, Mass.,.....	Oct., 1876
Cottle, Henrietta V.,....	West Athens, Maine,...	Oct., 1879
Culver, Annie J.,.....	East Dorset, Vt.,.....	Sept., 1878
Daniel, Sylvia E.,.....	Green River, Vt.,.....	Sept., 1874
Downey, Mary T.,.....	South Boston, Mass.,...	Oct., 1876
Driscoll, Julia,.....	Abington, Mass.,.....	Sept., 1878
Emiley, Alice C.,.....	Marlboro, Mass.,.....	Sept., 1876
Emery, Emma R.,.....	Medford Center, Maine,.	Sept., 1877
Fifield, Mahala C.,.....	West Deer Isle, Maine,.	Sept., 1875
Frueh, Louisa J.,.....	Hamden, Conn.,.....	Sept., 1880
Gilson, Julia E.,.....	Hartland, Vt.,.....	Sept., 1875
Gray, Clara M.,.....	Hodgdon, Maine,.....	Sept., 1876
Griffin, Mary E.,.....	Fall River, Mass.,.....	Sept., 1878
Hale, Hattie R.,.....	Portland, Conn.,.....	Oct., 1876
Harding, Adella,.....	Rockland, Maine,.....	Dec., 1876
Harding, Mabel,.....	Edgecomb, Maine,.....	Sept., 1879
*Harniman, Amy,.....	New Haven, Conn.,.....	Sept., 1876
*Hawley, Mary J.,.....	Leverett, Mass.,.....	Sept., 1879

NAME.	RESIDENCE.	ADMISSION.
Holland, Honora,.....	Fall River, Mass.,.....	Nov., 1877
Hopkins, Anna E.,.....	Augusta, Maine,.....	Jan., 1878
Hull, Lovina,.....	Plainville, Conn.,.....	Sept., 1873
Hunter, Lottie M.,.....	Clinton, Maine,.....	Sept., 1875
Jencks, Carrie L.,.....	East Hartford, Conn.,....	Sept., 1877
*Kelly, Johanna,.....	Fall River, Mass.,.....	Sept., 1874
Kendall, Florence M.,...	Strafford, Vt.,.....	Sept., 1877
Kinmartin, Sarah J.,...	Charlestown, Mass.	Sept., 1879
Larkin, Winnie,.....	Fitchburgh, Mass.,.....	Sept., 1876
Lawson, Alice L.,.....	Lowell, Mass.,.....	Sept., 1874
*Leavitt, Annie R.,.....	Charlestown, Mass.,....	Sept., 1876
Leonard, Alice,.....	West Bridgewater, Mass.,	Dec., 1877
Lockhart, Dora M.,.....	Holliston, Mass.,.....	Sept., 1878
*Loomis, Georgie A.,...	Bridgeport, Conn.,.....	Sept., 1873
Lynch, Mary E.,.....	Greenville, R. I.,.....	Sept., 1880
Magoon, Alice A.,.....	Craftsbury, Vt.,.....	Sept., 1878
Marnock, Anna M.,.....	South Albany, Vt.,....	Sept., 1879
Marshall, Edith H.,....	Bridgeport, Conn.,	Sept., 1879
McKay, Ellen E.,.....	Bristol, R. I.,.....	Nov., 1878
*McQueeny, Fanny,.....	New Haven, Conn.,....	Oct., 1875
Merrill, Emma M.,.....	Exeter, N. H.,.....	Sept., 1880
*Millard, Adeline E.,...	Palmer, Mass.,.....	Sept., 1874
Nelligan, Annie,.....	North Cambridge, Mass.,	Sept., 1879
Newton, Alice E.,.....	Hartford, Vt.,.....	Sept., 1874
Nolan, Margaret,.....	Concord, N. H.,.....	Sept., 1877
*Norcross, Florence N.,..	Jacksonville, Vt.,.....	Oct., 1872
Noyes, Flora,.....	Franklin Falls, N. H.,...	Sept., 1876
Noyes, Nora,.....	Franklin Falls, N. H.,...	Sept., 1876
O'Connell, Katie,.....	Holliston, Mass.,	Sept., 1880
O'Neil, Ellen,.....	Stafford, Conn.,.....	Sept., 1877
Packard, Adella M.,....	Wales, Mass.,....	Sept., 1878
Perry, Minnie B.,.....	Lake Connecticut, Vt.,...	Sept., 1879
*Quinn, Margaret,.....	Fall River, Mass.,.....	Sept., 1876
Ratchford, Mary,.....	Worcester, Mass.,.....	Sept., 1880
Richardson, Lillie M.,...	Square Pond, Conn., ...	Sept., 1876
Rock, Cordelia,	Staffordville, Conn.,....	Sept., 1879
Rockwell, Cora, E.,....	Ely, Vt.,.....	Sept., 1877
Russell, Kate E.,.....	Lovell Center, Maine,...	Sept., '75 & '80

NAME.	RESIDENCE.	ADMISSION.
Sage, Rosa E.,	Middletown, Conn.,	Sept., 1875
*Schortman, Pauline, . . .	Broad Brook, Conn.,	Sept., 1873
Schmahl, Emilie,	New Haven, Conn.,	Sept., 1877
*Seeley, Minnie B.,	Houlton, Me.,	Sept., 1873
Shirley, Bertha S.,	Norwich, Conn.,	Oct., 1879
Sillick, Anna E.,	Norwalk, Conn.,	Oct., 1880
Simmons, Cynthia M., . . .	Scituate, R. I.,	Sept., 1879
*Skiff, Alice M.,	North Tisbury, Mass.,	Sept., 1873
Smart, Carrie,	West Athens, Maine,	Sept., 1880
Sullivan, Honora,	Cambridgeport, Mass.,	Sept., 1879
Taylor, Florence A.,	East Orleans, Mass.,	Sept., 1877
*Tilton, Eva B.,	Cheshire, Mass.,	Oct., 1874
Tuller, Fannie A.,	West Suffield, Conn.,	Sept., 1876
Upton, Abbie D.,	Bethel, Maine,	Sept., 1875
Ward, Mary J.,	Hartford, Conn.,	Sept., 1872
Weis, Elisé,	New Haven, Conn.,	Sept., 1880
*Westgate, Mary A.,	Fall River, Mass.,	Sept., 1872
Whitehouse, Daisy,	Liberty, Maine,	Sept., 1880
*Woodworth, Sarah E., . . .	Brooklyn, N. Y.,	Sept., 1878
Wright, Emma E. P.,	East Weymouth, Mass.,	Nov., 1880

SUMMARY.

SUPPORTED BY	MALES.	FEMALES.	TOTAL.
Maine,	21	13	34
New Hampshire,	17	5	22
Vermont,	8	10	18
Massachusetts,	51	30	81
Rhode Island,	4	3	7
Connecticut,	34	26	60
Friends,	1	2	3
Total,	136	89	225

Whole number in attendance within the year, 225
 Greatest number at any one time, 190
 Average attendance during the year, 184

*Not present May 1, 1880.

†Dead.

COMPOSITIONS.

[The following compositions are given as specimens of an interesting exercise in translating from signs. Classes of various grades, from one year to seven years standing, were assembled in the chapel, and the story, given below, was told and repeated *once* by the principal, and, without any other assistance, the pupils were required immediately to reproduce the story in written language. The specimens given are *absolutely without correction*, and show how much ability each had to understand ideas from signs and to express the ideas in his own language. It is desired to call attention to the variety of phraseology in expressing the same idea, and especially to the difference between the language of semi-mutes and that of those congenitally deaf.]

Many years ago Gregory stayed in the dungeon. He was willful and disobedient. The jailor reproved Gregory often and often whipped Greg in the cell. He locked the door. The prisoners displeased with Gregory. Greg had no any friend. The jailor called him ugly Greg. Some good people carried the flowers into the dungeon. They put the flowers in the bracket. They fastened the bracket on the wall. They thought perhaps ugly Greg did not like the flowers. One night ugly Greg disliked to work. Ugly Greg went into the dungeon. He saw a rose in the vase. He looked the rose and smelled the rose, put the rose in the bracket. The next morning Greg poured the water into the vase. Every day he kept the rose. By and by he became sick. A nurse carried Greg to the hospital. The nurse laid Greg on a bed. He carried Greg's rose and put it on the stool near the bed. Greg lay in the bed and looked at the rose. He saw a new*bud. He was very sick. The nurse put the rose near Greg. In a few hours the rose opened. The nurse came to Greg's bed. He saw the open rose. He called Greg. Greg did not speak to the nurse. He held his hand on Greg. Greg was cold. The nurse thought Greg was dead. Greg held his one arm on his head. He held his another hand around the rose. Greg was dead. The rose taught Greg became better. D. B. T.

(14 years old. Congenital. At school two years.)

Some people lived in Detroit. They were willful. A prisoner stayed in a cell. The prisoner was bad. A nurse put a vase on a bracket. A rose was in the vase. The nurse often reproved the prisoner. The prisoner often disobeyed. He looked at the rose. He became pleasant. His heart was soft. He smelled the rose. His name was Greg. Suddenly Greg was sick. The nurse lifted Greg and carried him to a bed. Greg became very sick. The nurse took the vase and carried it on a

table. Greg looked at the rose. The rose began to grow. Greg was happy. The nurse took the vase and put it on the pillow. The nurse went out of the room. By and by the nurse came to the room. The nurse saw that the rose grew. He called Greg. Greg did not tell the nurse a word. The nurse put his hand on Greg's hand. Greg's hand was cold. Greg's hand put on his grey hair, and the other hand held the vase. The nurse saw Greg was dead. P. M. A.

(12 years old, Born deaf. In school three years.)

There was a large prison in Detroit. There were many bad people in it. One there was a hard-hearted man who was named Gregory. He was very willful and disobeyed. Some prison keepers often punished him and put him in a dark dungeon, but he did not become a good man. Other prisoners hated him, and nobody was fond of him. They called him Ugly Greg. Some good people meant to put some vases of flowers on the brackets in the cells of the prison. They did so and put a rose in a vase on one of the brackets which was near Ugly Greg's room, but they thought that he would not care for it. In the afternoon after work he went in the prison and saw the rose, and was very much surprised. He then took the vase and looked at the rose and smelled it. He kept it every day. Once he was sullen but he now was pleasant. The next morning, before he went away, he poured some water in the rose. He often talked with it and they looked loving at each other. He often took the vase and carried it into his room and slept near it. By and by he was sick. Some of the prison keepers carried Ugly Greg to a hospital and carried the vase there. He put it on a stand near his bed. He often looked at it and saw that a bud was beginning to be a rose. A nurse put the stand by Greg's bed and left him. In a few hours the bud became a rose. The nurse came and saw the rose. She called Greg to look at it but he did not answer her. She put her hand on his hand and was surprised because his hand was cold. He died. When he died his hand was in his grey hair and his other hand was around the vase. The rose made him to be a good man. He was better than the prisoners because he kept his rose. F. N.

(Born deaf. In school four years. 13 years of age.)

There was a large state prison in Detroit which the many prisoners lived in. They were very bad and willful. A few years ago one of them who was named Gregory was very bad and wicked in that prison. A keeper punished him often and he could not make him a good man. He put him in a dungeon and called him Ugly Greg. All the prisoners hated and disliked him. They thought that he would not become a good man. The good people thought that he would become a good man. They got some brackets and carried them into the prison.

They hung them with some nails on the each cell's wall. One of the people put a rose in a vase on the bracket near Greg's place. After he had worked, he came to his place where he was put in. While he was going, he saw a vase with the rose on the bracket. He was very glad and took it in his hand. He pleased to smell the flowers. He put them on the bracket and went into the cell. He slept there all night and rose up. Before he went to work, he took the flowers and smelled them. He put it on the bracket again. He worked very hard all day. Every day he poured water in the vase to make the flowers grow up. At last he became very sick. The keeper carried him into the Hospital. Greg took flowers and carried them into the hospital. The nurse took care of him. The sick man slept in the bed near a standing-table on which was the flowers, in the vase. He looked at them and pleased. He was very fond of them, because they made him a good man. At last the nurse put them near him on the bed. He was gone. While Greg was looking at the flowers, then he died. The man came into his room and called Greg, but he did not awaken. He came near and felt Greg's cold hand. He saw one of his hands on his head and he taking the flowers in the other. The flowers made him a very good man. W. E.

(Born deaf. In school six years. 16 years old.)

There is a large prison in Detroit, in Michigan. Many bad men were arrested and put into the prison. Some years ago, a very bad man was arrested and put into it. His name was Gregory. Gregory often disobeyed the master of the prison, and the master put him into a dungeon. He could not become a good man. He was a very willful man. The prisoners did not like him, and Gregory had no friends in the prison. One day, some good people went into the prison with some flowers and brackets. They put a bracket against the wall in each cell, and put some flowers on the bracket. They also put the bracket against the wall in Gregory's cell, and put some good and beautiful flowers on the bracket. They thought that perhaps Gregory did not like the flowers and he threw them away. When Gregory had done working, he went into his cell and saw the flowers on the bracket. He took hold of the flowers in his hand and smelled them. Then he put them in a cup and poured some water into the cup. The next morning he poured some fresh water into the cup. He took good care of the flowers. Soon after, he happened to be sick, and he was taken to a hospital. A nurse took care of him in the hospital. He put the flowers on the stand which was near a bed of Gregory. While Gregory was lying in the bed, he liked to look at the flowers. He happened to see a little blossom among the flowers. The nurse placed the flowers near Gregory's head and went away. In several hours, the little blossom grew large. The nurse came and saw the large blossom. Then he said to him that the blossom grew large, but he saw him lying

still in the bed. Then he put his hand on Gregory's hand, and he felt cold. He understood that Gregory was dead. While Gregory was dying in the bed, he put one hand on his head and he took hold of the flowers in another hand. The beautiful flowers helped him to become a good man. It was a very good lesson for him. While Gregory was in the prison, he obeyed the master faithfully. He was a very best prisoner in the prison because he often obeyed the master perfectly.

S. B. S.

(Born deaf. In school seven years. 18 years old.)

In a city of Detroit there is a prison. Thousands of people are caught and put in the prison. Many years ago a very bad man was caught and put in the prison. His name was Gregory. He was often disobedient and willful. The jailor did not like him and often scolded him and punished him, by putting him into a dark dungeon. The jailor called him Ugly Greg because he was cross. Ugly Greg had no friends, and nobody liked him. There were many good people living in the city. They made brackets and got some flowers and went to the prison, and then they hung the brackets on the walls in each cell, and put the flowers on them. They put a bracket and some roses in Gregory's cell. After Gregory had finished working he went into his cell, and he saw the flowers and wondered how they came to be there. He went toward the roses and smelled of them, and gave them some water. One night he took the flowers off the bracket and placed them near his bed. Before he went to work in the morning he always was sure to water his roses, and he took good care of them. It happened one day that Gregory became sick, and was taken to the hospital. He took his flowers with him and placed them on a stand near his bed. Gregory often looked at the roses and fell asleep. The buds were growing, and in a few hours the roses were in full bloom. The nurse saw the roses, and spoke Gregory's name, but he did not answer. At last the nurse felt of his hand. It was cold, and Gregory was dead. One of his arms was on his head, and the other was around the roses. The roses had softened his hard heart, and that is how he became a good man.

M. E. A.

(Deaf at five years. In school five years. 13 years old.)

There was a large jail in Detroit. There were many prisoners in it. Some years ago there was a bad and willful prisoner named Gregory. The jail-keeper called him Ugly Greg. He was often reprov'd and punished, by being put into a dungeon. All the other prisoners hated him. Once some good people who lived in Detroit thought they would put some flowers in the jail. So they went to the jail and fastened a bracket to the wall in each cell. They put a rose on the bracket in

Greg's cell. They thought Greg would not like it, but when his work was over in the evening, and when he returned to his cell, he was surprised to see the rose. He smelt of it, and in the next morning he watered it. He kept it for a long time. By-and-by Greg happened to get ill, and he was carried to the hospital. The nurse brought in the rose and placed it on a stool near his bed, and then left him. Greg watched the rose, and by-and-by he saw it begin to blossom. By-and-by the nurse came in and called Greg, but he did not answer. He touched him, and when he felt his cold hand, he knew he was dead. One of his hands was placed on his white and black hair, and his other holding the rose. Greg was the best man among the prisoners, but the rose softened his heart.

T. I. L.

(Deaf at seven years. At school six years. 15 years old.)

In Detroit, Michigan, there was a large prison in which all those who did wicked things were sent. A few years ago there was a very wicked man named Gregory who was sentenced there. He was very willful, and hard-hearted, and gave the keeper a great deal of trouble. They punished him by putting him in a dark dungeon, but this made him worse. All the prisoners were against him, and he had not a single friend for a companion. So he was hated and despised by all who came near him. He was so ugly and cross that the keepers of the prison called him "Ugly Greg." By-and-by the Christians of Detroit thought they would give each prisoner a plant in a flower-pot, and place it upon a bracket nailed to the wall, near each of the prisoner's cell-doors. They did as they intended, and when they came to Greg's door they placed a rose-bush on the bracket for him. They thought that when he saw it, he would throw it away, or perhaps would not care for it. But they were mistaken, for when Greg returned from work he looked not a little surprised. He was much pleased and took it up carefully. After looking at it for some time, he put it to his nose to smell it. He watered it before going to bed, and the next morning he did the same. The flower gave him much pleasure, and he loved to watch it, and it is said that he even talked to it as if it was a live creature. This little flower had much influence over him, for it made the strong man's heart grow softer to those around him, so that he soon gained their hearts. His ugliness was soon succeeded by smiles. He became the very best prisoner. He cared more for his plant than for anything else. In the evening when he returned from his work before going into his cell for the night, he always took the plant with him, and when he got up in the morning he would place it back in its place on the bracket before going to work. He never forgot to water it. Well, one day he was taken ill, and the keeper had him taken to the hospital. When asked what he wanted he said, "My flower." It was brought and placed on a stand near his bed. He took much pleasure

in watching it, and he often kept his eyes on it for hours. One day he was much brightened to see a bud peeping out from among the leaves. But it was noticed that he could not get better, for the disease grew worse and worse every day. One day before Greg's nurse went out she placed the flower-pot in Greg's favorite place on the stand near the bed where he could look at it. The bud was half-blossomed when she left the room. In a few hours she returned, and found the bud in full bloom; she went up to the bed to call Greg, but received no answer. She spoke louder this time, saying, "GREG, GREG," but still no answer. When she touched his hand, she was frightened to find him dead, it was so cold. Thus died the once heard-hearted Greg, with his left hand on his head which was still full of gray hairs, and his right hand around his favorite flower-pot. This story shows that even little flowers can influence hard-hearted men to become good and kind. F. McQ.

(Deaf at five years. At school five years. 13 years old.)

TERMS OF ADMISSION.

I. The Asylum will provide for each pupil board, lodging, and washing, the continual superintendence of health, conduct, manners, and morals, fuel, lights, stationery, and other incidental expenses of the school room, for which including Tuition, there will be an annual charge of one hundred and seventy-five dollars.

II. In case of sickness the necessary extra charge will be made.

III. No deduction from the above charge will be made on account of vacation or absence—except in case of sickness.

IV. Payments are always to be made six months in advance, for the punctual fulfillment of which a satisfactory bond will be required.

V. Each person applying for admission must be between the ages of EIGHT and TWENTY-FIVE years; must be of good natural intellect, capable of forming and joining letters with a pen legibly and correctly, free from any immoralities of conduct and from any contagious disease.

Application for the benefit of the legislative appropriations in the States of Maine and New Hampshire should be made to the Secretaries of those States respectively—in Massachusetts to the Secretary of the Board of Education—in each case stating the name and age of the proposed beneficiary, and the circumstances of his parents or guardian. Applications as above in Vermont, Rhode Island, and Connecticut respectively, should be made to his Excellency, the Governor of the State. In all cases a certificate from two or more of the selectmen, magistrates, or other respectable inhabitants of the township or place to which the applicant belongs should accompany the application.

Those applying for the admission of *paying pupils* may address their letters to the Principal of the Asylum, and on all the letters from him respecting the pupils postage will be charged.

The time for admitting pupils is the *second Wednesday of September*, and at no other time in the year. Punctuality in this respect is very important, as it cannot be expected that the progress of a whole class should be retarded on account of a pupil who joins it after its formation. Such a pupil must suffer the inconvenience and the loss.



It is earnestly recommended to the friends of the deaf and dumb to have them taught to write a fair and legible hand before they come to

the Asylum. This can easily be done, and it prepares them to make more rapid improvement.

When a pupil is sent to the Asylum, unless accompanied by a parent or some friend who can give the necessary information concerning him, he should bring a written statement embracing specifically the following particulars:

1. The name in full.
2. Post-office address and correspondent.
3. Day, month, and year of birth.
4. Cause of deafness.
5. Names of the parents.
6. Names of the children in the order of their age.
7. Were the parents related before marriage? If so, how?
8. Has the pupil deaf-mute relatives? If so, what?

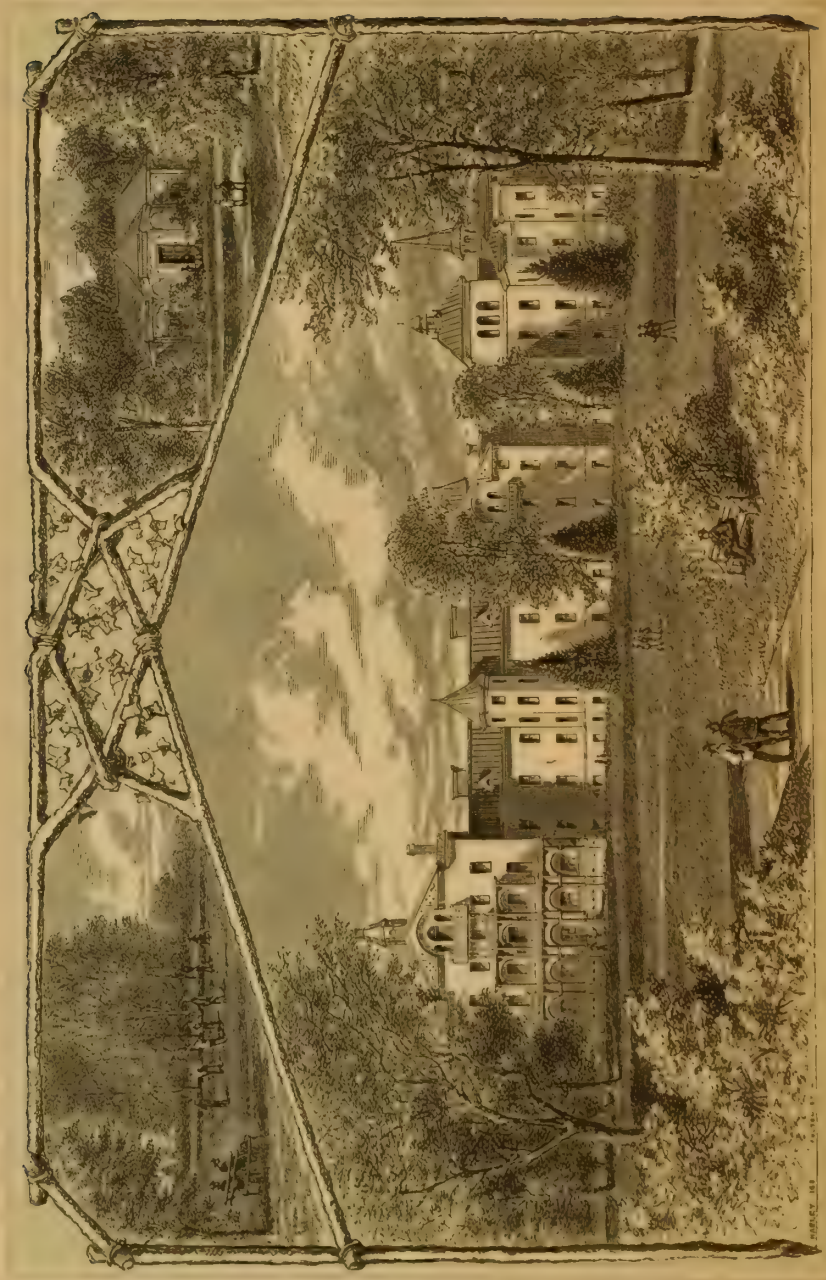
The pupil should be *well clothed*—that is, he should have both summer and winter clothing enough to last one year, and should be furnished with a list of the various articles, each of which should be marked. A small sum of money—not less than five dollars—should also be deposited with the Steward of the Asylum for the personal expense of the pupil not otherwise provided for.

Packages of clothing or boxes sent by express will reach the pupils safely.  *The express charges should in all cases be prepaid.* 

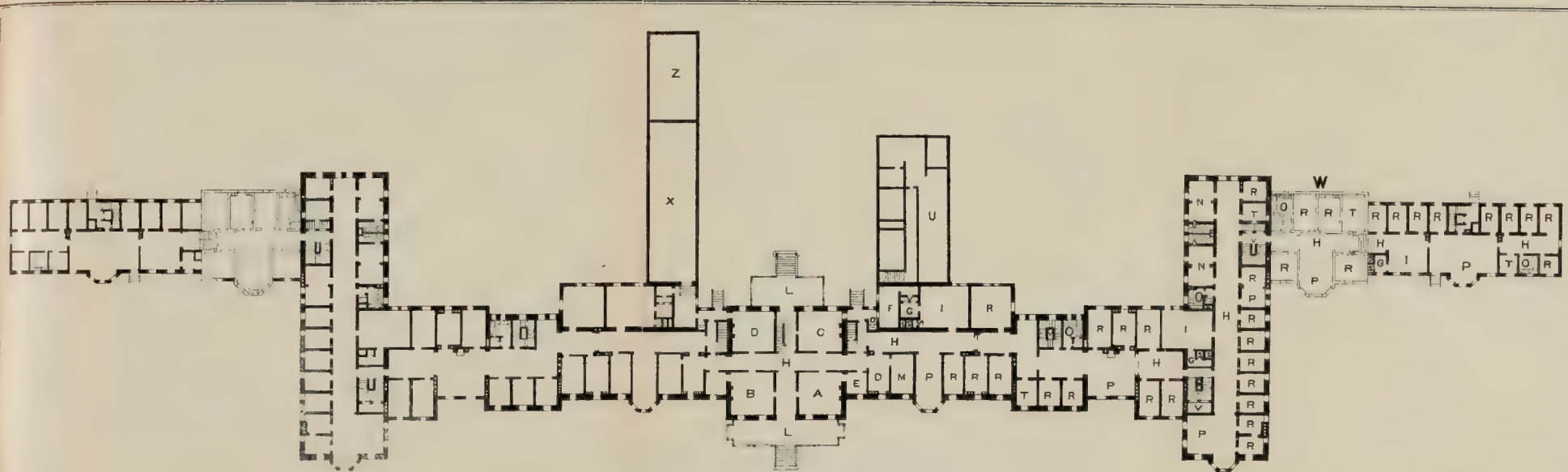
Careful attention to these suggestions is quite important.

There is but one vacation in the year. It begins in the last Wednesday of June and closes on the second Wednesday of September. It is expected that the pupils will spend the vacation at home. This arrangement is as desirable for the benefit of the pupils, who need the recreation and change of scene, as for the convenience of the Institution, thus affording opportunity for the necessary painting, cleansing, etc. The present facilities for travel enable most of the pupils to reach home on the evening of the day they leave Hartford. Every pupil is expected to return punctually at the opening of the school on the second Wednesday of September.

On the day of the commencement of the *vacation* an officer of the Asylum will accompany such pupils as are to travel on the railroads between Hartford and Boston, taking care of them and their baggage, on condition that their friends will make timely provision for their expenses on the way, and engage to meet them immediately on the arrival of the *early* train at various points on the route previously agreed on and at the station of the Boston & Albany Railroad in Boston. A similar arrangement is made on the Connecticut River Railroad as far as White River Junction. No person will be sent from the Asylum to accompany the pupils on their return, but in their fare is paid and their trunks are checked to Hartford, it will be safe to send them in charge of the conductor.



CENTER AND NORTH WING OF THE RETREAT.



PLAN OF PRINCIPAL FLOOR.

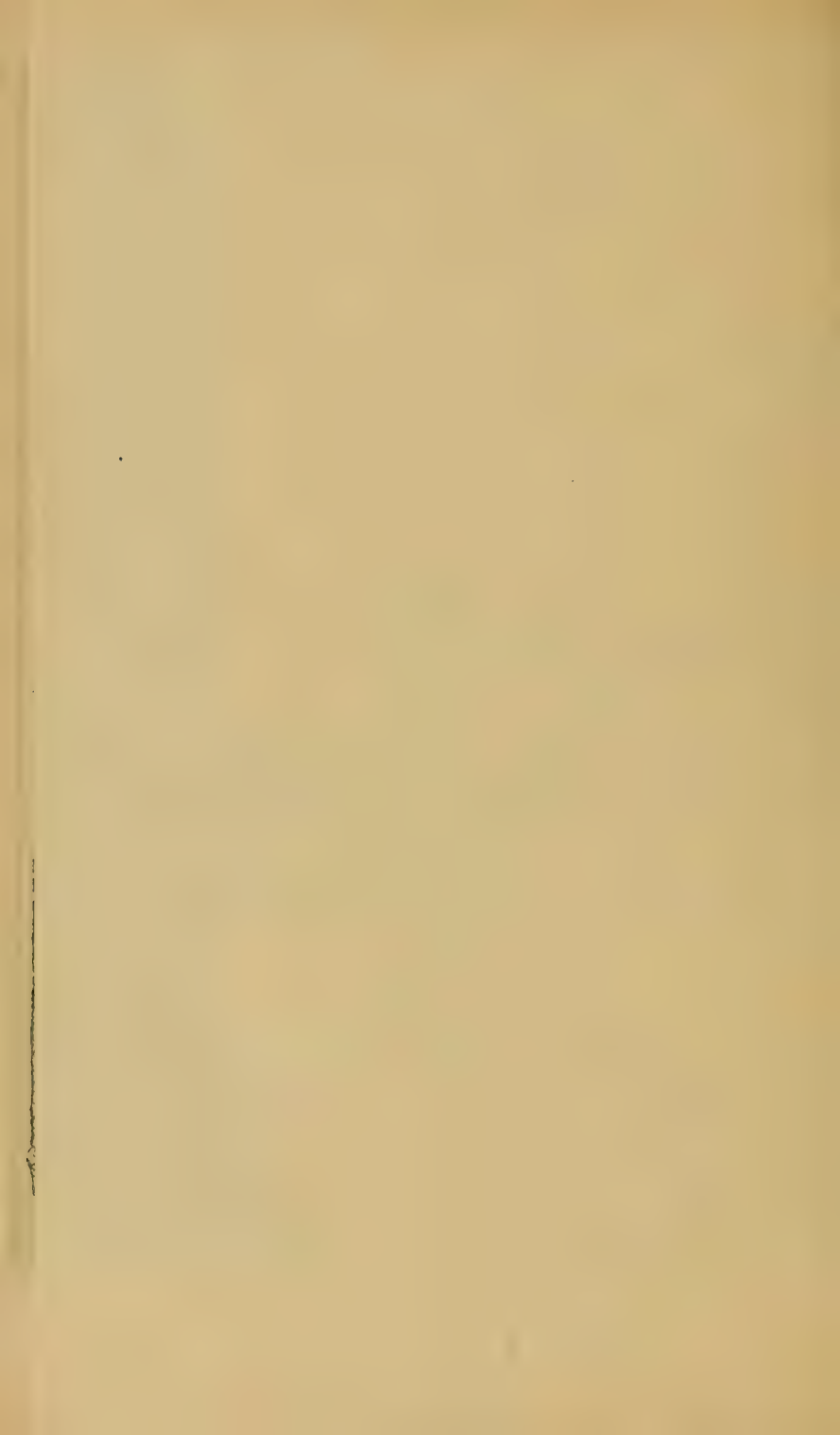
A Superintendents Office.
 B Public Parlor.
 C Stewards Office.
 D Reception Rooms.
 E Dispensary.
 F Store Room.

G Pantry.
 H Corridor.
 I Dining Rooms.
 K Dust Flies.

L Porticos.
 M Directors Room.
 N Suites of Rooms (Parlor, Bed Room, Bath Room & Water Closet.)

O Bath Rooms & Water Closets.
 P Parlors.
 R Bed Rooms.
 S Lifts.
 T Clothes Rooms.
 U Bakery and Store Rooms.

V Ventilating Shafts.
 W Intended Addition.
 X Amusement Hall.
 Z Boiler House.



THE
FIFTY-SEVENTH ANNUAL REPORT
OF THE
OFFICERS
OF THE -
RETREAT FOR THE INSANE,
AT
HARTFORD, CONN.,
April, 1881.



HARTFORD, CONN.:
PRESS OF THE CASE, LOCKWOOD & BRAINARD COMPANY.
1881.

OFFICERS
OF THE
RETREAT FOR THE INSANE,
FOR THE YEAR 1881.

WILLIAM R. CONE, *President.*
CALVIN DAY, *Vice-President.*
THOMAS SISSON, *Treasurer.*
WM. F. TUTTLE, *Auditor.*
JONATHAN B. BUNCE, *Secretary.*

DIRECTORS CHOSEN AT THE ANNUAL MEETING.

CALVIN DAY,	F. B. COOLEY,
HORATIO E. DAY,	CHARLES M. BEACH,
GURDON W. RUSSELL,	GEORGE W. MOORE,
E. K. HUNT,	NATHANIEL SHIPMAN,
JAMES L. HOWARD,	THOMAS SISSON,
THOMAS SMITH,	J. C. JACKSON,
GEORGE P. BISSELL,	JOS. R. HAWLEY,
MARK HOWARD,	WM. F. TUTTLE,
J. B. BUNCE,	RODNEY DENNIS,
G. M. BARTHOLOMEW,	THOMAS O. ENDERS.

MANAGERS.

WILLIAM R. CONE, *Ætna Bank.*
CALVIN DAY, *73 Asylum Street.*
GURDON W. RUSSELL, *490 Main Street.*

HENRY P. STEARNS, M.D., *Physician and Superintendent.*
CHARLES W. PAGE, M.D., *Assistant Physician.*
H. S. NOBLE, M.D., *Junior Assistant Physician.*
REV. WM. THOMPSON, D.D., *Chaplain.*
REV. GEO. E. SANBORNE, *Steward.*
MRS. GEO. E. SANBORNE, *Matron.*
MISS HARRIET E. BACON, *Supervisor.*
J. M. EVANS, *Clerk.*

VISITING COMMITTEE.

DIRECTORS.

1879.	June, Messrs.	SHIPMAN, BUNCE, HAWLEY, BEACH.
	July, "	H. E. DAY, SISSON, J. L. HOWARD, JACKSON.
	Aug., "	SMITH, BISSELL, M. HOWARD, MOORE.
	Sept., "	COOLEY, ENDERS, BARTHOLOMEW, DENNIS.
	Oct., "	SHIPMAN, BUNCE, HAWLEY, BEACH.
	Nov, "	H. E. DAY, SISSON, J. L. HOWARD, TUTTLE.
	Dec., "	SMITH, BISSELL, M. HOWARD, MOORE.
1880.	Jan., "	JACKSON, ENDERS, BARTHOLOMEW, DENNIS.
	Feb., "	SHIPMAN, BUNCE, HAWLEY, BEACH.
	March, "	H. E. DAY, SISSON, J. L. HOWARD, COOLEY.
	April, "	SMITH, BISSELL, M. HOWARD, MOORE, TUTTLE.
	May, "	JACKSON, ENDERS, BARTHOLOMEW, DENNIS.

MEDICAL VISITORS.

E. K. HUNT, M.D.,	LEWIS WILLIAMS, M.D.,
GURDON W. RUSSELL, M.D.,	FRANCIS BACON, M.D.,
P. M. HASTINGS, M.D.,	GEORGE L. PORTER, M.D.

VISITING COMMITTEE OF LADIES.

Mrs. WM. R. CONE,	Mrs. THOMAS SMITH,
Mrs. CALVIN DAY,	Mrs. P. M. HASTINGS,
Mrs. F. B. COOLEY,	Mrs. THOMAS SISSON,
Mrs. J. H. SPRAGUE.	

THE FIFTY-SEVENTH REPORT
OF THE
BOARD OF MANAGERS
TO THE
BOARD OF DIRECTORS OF THE RETREAT FOR THE INSANE.
APRIL, 1881.

THE year now closed presents no features of unusual importance to be reported. The Asphalt walk along the eastern driveway mentioned in our last report has been completed. The only other work upon the Retreat grounds has been the erection and furnishing of the new cottage by I. Luther Spencer, Esq., of Suffield, Connecticut, for the occupancy of his daughter. It has been completed and furnished in accordance with instructions received from the Board of Directors, and has for some months been occupied by the young lady for whose accommodation and comfort it was built. The cottage consists of six rooms, with a piano for her use and amusement, and otherwise appropriately furnished, all at the expense of the father, in which his afflicted and invalid daughter finds a home, architecturally beautiful, with delightful surroundings and a pleasant outlook across our extensive lawn, to which it is an attractive addition. It is hoped that this effort and expenditure, so liberally made, may contribute to the comfort and restoration of this patient for whom it was specially provided.

Heretofore the Retreat has been dependent for its ice supply

upon ice procured at various places, where we have been able to obtain it. At times it has been very difficult to obtain a sufficient supply of a satisfactory quality. In view of this, the Board of Managers have caused an ice pond to be constructed, supplied with an abundance of pure water from the copious spring upon the farm where the pond is located, and which has this winter and will at all times hereafter supply the institution with an abundance of the purest ice.

During the year, a legacy to the Retreat, under the will of Mrs. Anne E. P. Sever of Boston, of \$5,000, has been received, which to that extent has increased the charitable resources of the institution. Mrs. Sever well knew the wants of the institution, its charitable work, having among her own friends seen and experienced its benefits, and she has thus, in her gratitude and sympathy, of her substance, provided for the destitute insane sufferer. An imitation of her kind and timely gift by others, who of their abundance might aid in this excellent charity, would furnish the means of restoring many an insane patient to reason and usefulness, and aid the Retreat in the accomplishment of its mission of good. We ask this aid in behalf of our suffering and destitute fellow-men. In this connection we can not omit to refer again to the persistent effort there is on the part of persons and parties to create the impression that the managers of the Retreat are paid for their services, and we again reiterate what has so often been stated in our reports, that since its organization in 1823 the management of the Retreat has been wholly and absolutely gratuitous.

Again an effort has been made to impose upon this charity the burthen of taxation and to the extent of that burthen to diminish our ability to provide for the care and restoration of such insane patients as have no other means of securing the benefits of the institution. But we are happy to report its failure, and after the long, patient, protracted and full hearing, which we have had before the Board of Relief upon this subject, we can not but hope that all the parties will cordially and cheerfully acquiesce in the results, and that to the utmost extent of our resources no patient

unable to pay will have to be refused, by reason of our own inability to aid in his restoration in consequence of taxation.

The management of the institution has met our full approval, and all its employers are entitled to our commendation.

During the year, Mrs. Page, the wife of Dr. Charles W. Page, our assistant physician, who, in 1874, became an inmate of the Retreat family, and for several years has labored under a pulmonary affection, has died. Though Mrs. Page was in no wise actively engaged in the management of the affairs of the institution, yet we knew her worth and bear this testimony to her devotion to her family, to her cheerful, pleasant and happy association with the patients, her patient endurance during her years of suffering, to her Christian character and her abiding hope, as her end approached.

Her death occurred at the Retreat, from which her funeral was attended, the services being conducted by the chaplain, assisted by the Rev. E. P. Parker, the pastor of the South Church, which she attended. It is worthy of record that no other like event has ever taken place at the Retreat buildings since its first organization.

By order of the Board,

WILLIAM R. CONE, *Chairman.*

REPORT OF THE MEDICAL VISITORS.

To the Directors of the Retreat for the Insane :

The Medical Visitors would respectfully report :

That they have, as heretofore, made monthly visits to the Retreat; and, as our examinations have generally been made at irregular, unexpected periods, we believe that in this way we have become practically acquainted with the every-day work of the institution.

Few instances of the use of restraining appliances have been noted, and these, upon investigation, have been amply justified on the part of the officers. We are, by personal observation, assured that harsh or unkind treatment of patients by attendants is exceedingly rare, and never countenanced by the officials of the Retreat.

In examining the halls, dining and private rooms, we are pleased to notice that neatness and good order are always conspicuous.

We have also noticed a special desire on the part of officers and attendants to provide for the needs of patients, physically as well as mentally. Even more attention than in previous years has been bestowed upon the occupation and amusement of the inmates, and has been productive of great benefit.

Our quarterly visits, more especially, have been principally occupied in hearing fancied grievances on the part of patients. Full liberty has always been given for such complaints, and the visitors have patiently listened. Every facility has been afforded by the officers of the institution to enable us to make thorough investigation in all such cases, and we have thus formed

independent opinions. We have always given our results to the superintendent, and in some instances, where it seemed proper, to the patient. Our conclusions have been received kindly, and we have reason to believe have benefited both officers and patients.

E. K. HUNT, M.D.,
GURDON W. RUSSELL, M.D.,
P. M. HASTINGS, M.D.,
LEWIS WILLIAMS, M.D.,
FRANCIS BACON, M.D.,
GEORGE S. PORTER, M.D.

REPORT OF THE SUPERINTENDENT.

To the Board of Directors of the Retreat for the Insane :

GENTLEMEN—I have the honor herewith to submit the fifty-seventh annual report of the Retreat.

On the 31st of March, 1880, the whole number in the Retreat was, of males, sixty-eight; of females, seventy-five; total, one hundred and forty-three. Number of patients.

The admissions during the year have been, of males, sixty; of females, fifty-four; total, one hundred and fourteen. Admissions.

The discharges have been, of males, sixty-two; of females, fifty-three; total, one hundred and fifteen. Discharges.

The deaths during the same period have been, of males, sixteen; of females, seven; total, twenty-three. Deaths.

The whole number under treatment during the year has been, of males, one hundred and twenty-eight; of females, one hundred and twenty-nine; total, two hundred and fifty-seven. Whole number

The number in the Retreat on the 31st of March, 1881, is, of males, sixty-six; of females, seventy-six; total, one hundred and forty-two. Present number

During the Retreat-year of 1879 and '80, the admissions were nearly one-fourth larger than during the year next preceding, which was due chiefly to our increased accommodations. This year, it will be observed, they have been still more numerous, being more than during any year since my connection with the Retreat. If the accommodations had been still larger, we should have been able to receive and care for many whom we have Character of Admissions.

been obliged to refuse, as in past years. This, however, will be changed during this year, as the increased accommodations at Middletown will doubtless be sufficient for all who may be entitled to treatment there, while we shall probably have room to spare.

In seventy-eight, or more than sixty-eight per cent. of the one hundred and fourteen admissions, the history, as presented by friends, indicated that there had been no previous attack; in sixteen, there had been one; in four, two; in one, eight; while in thirteen cases it was not positively known how many previous attacks there had been, but certainly a very considerable number, during which these persons had been treated in other institutions.

Thirty-seven of the number were past fifty years of age, while only three were under twenty, and seventeen were over sixty. Of those whose disease was due to the excessive use of alcohol, one and possibly two may indulge some expectation of a recovery.

In an unusually large number, during the last year, the form of disease has been one of excitement. During the years of '78 and '79, the numbers of the depressed and melancholic were greater than of the excited, while this year the latter class has doubled the former in numbers. The form of excitement has also been extremely acute and persistent, in an unusually large number; and the disease had passed far towards the stage of exhaustion before the cases were received. This has necessitated an unusually large number of attendants, in order to secure efficient care and nursing, and also an unusual amount of highly-concreted and nourishing food and stimulants. Contrary to the usual experience of the Retreat, the number of admissions from males has been greater than from females. I believe this has been the case in five years only, during the last twenty-six.

Among those admitted there have been twenty persons

who had previously been in the Retreat one or more times. Of this number, fourteen—eight males and six females—had been discharged as recovered, and six—four males and two females—had been discharged as not recovered. All the admissions refer to persons, and not to cases merely, no one having been admitted more than once during the year. The daily average has been eleven more than last year.

I herewith subjoin the usual table exhibiting the form of disease, as far as could be ascertained from the conditions existing and from the history presented by friends, in those admitted:

	Males.	Females.	Total.
Congenital Insanity.....	1	1	2
Puerperal ".....	1	1	1
Climacteric ".....	6	10	16
Syphilitic ".....	1	1	2
Epileptic ".....	1	1	2
Senile ".....	5	1	6
Traumatic ".....	1	1	2
Ovarian ".....	1	1	1
Idiopathic ".....	8	10	18
Insanity of Alcoholism.....	6	1	7
" " Adolescence.....	4	1	5
" " from Brain Disease.....	4	1	4
" " Opium.....	1	1	1
" " Sunstroke.....	1	1	1
Unknown.....	20	22	42
Folie Circulaire.....	2	1	3
Insanity of General Paralysis.....	1	1	1
	60	54	114

There have been of *recoveries* during the year thirty-six, *Recoveries* eighteen of each sex. Of this number thirty, fourteen males and sixteen females, had no previous recovery-record, while of the remainder, one female had had four, one male and female, each, had had three; and three males had each been twice discharged as recovered. The two females, one with three and the other with four recoveries, are of that class referred to in former reports, who are likely to be residents off and on for years in some asylum, being alternately in a comparatively

healthy, or excited condition. The case of this class referred to in my Report last year as having contributed *thirteen* to our record of recoveries during the last twenty-five years has, so far, remained in a very good degree of health at her own home.

The recoveries, as will be observed, have been rather more than thirty per cent. of all admissions, and something less than fifty per cent. of the number of first admissions. This coincides pretty nearly with our history in this respect during the last few years. Of course the ratio of recoveries as well as that of deaths will depend largely upon the character of the diseases and the ages of the persons received; also upon the length of time the disease had existed, and upon the degree with which it has affected the system. These conditions will necessarily vary somewhat from year to year, and thus affect more or less the history of our operations in this respect. Persons in whom the disease has existed for several years, or who have experienced several attacks, or persons beyond sixty years of age, or again those affected with organic disease of the nervous system, rarely recover, and consequently when any of these characters of disease largely prevail the percentage of recoveries becomes less. That, in an increasing number of cases, the insanity is dependent upon organic change in the cells, connective fibres, blood-vessels of the brain and spinal cord, I think there can be no doubt. This would indicate changed conditions and habits of society, and a neglect to either understand or practice such hygienic regulations as are necessary for mental health to a much larger extent than prevailed twenty years ago. When these conditions and laws shall be more fully understood by the great body of the common people, when they are made a part of the public education, as presented in periodicals, newspapers and school-books, so that all who run may read and comprehend them, we may look for a

diminution of the numbers and an amelioration in the character of the disease of those who now resort to asylums for treatment.

There have been discharged as *improved*, seventeen. Improved
How many of these will ultimately recover it is impossible to say, but fair to presume that some of them will. Thirty have been discharged as stationary. Some of them have been removed to their homes by friends under the impression that they will never recover, and therefore treatment in an asylum is useless, while others have been removed to State asylums with the view of economy.

The percentage of deaths has been a little higher than Deaths.
it was last year (8.94), and is as high as in any year of the last seven. Of the twenty-three persons who have died, more than one-third were past sixty years of age; and more than half died from organic changes in the nervous system; while five of the others died within ten days after their admission. One of these was the case of an unfortunate woman, who was brought to the Retreat bound hands and feet, with cords about the wrists and ankles, which had been so firmly applied and left in position for so long a time that they had actually worn into the flesh, and so far impeded the circulation that mortification had begun. Yet this patient was entirely quiet, and when the cords had been removed, a bath given, and she was placed in a comfortable bed, expressed as well as she was able in her exhausted condition her thanks for what had been so kindly done for her. All efforts to rally the sinking strength failed, and she died after a few days of comfortable quiet, expressing to the last her gratitude for the kindness shown to her.

This year much less has been expended in the way of Improvements.
permanent improvements than last year. The concrete walk, a portion of which was built last year, has been completed, and extends around the whole lawn, a distance

of three-fourths of a mile. A walk of similar character has also been built, extending from this, in two directions, to the new cottage, and the grounds have been graded in the vicinity.

During past years we have been obliged to cut and bring our ice from a pond located on Cedar Hill, a distance of something like two miles. Last autumn we constructed an embankment some eight feet in height on the lower portion of our pasture at the farm, by means of which we have a pond covering something like three-fourths of an acre. It is supplied with water from two or three springs, which are located on the slope above, and, during the past winter, our ice-house has been filled with ice cut from it. We have to bring it only about one-third the distance we formerly did, and it costs us nothing.

About one-half mile length of fence, which had become useless at the farm, has been replaced with new, during the year. I would call your special attention to the dilapidated condition of the old barns and piggery at the farm, and suggest the importance of new buildings located further from the street, a plan for which is herewith submitted.

A large amount of steam-pipe has been necessary in supplying the place of that worn out on both wings of the building, and a new line of return-pipe has been introduced, by means of which we expect to be able to dispense with the use of one boiler during the summer months. Eight new bath-tubs have been supplied, during the year, in place of old ones worn out; and a considerable sum has been expended in painting and repairs, so that the general condition of the Retreat is as good in all respects as at any time in the past.

In former years I have taken it for granted that some-
 thing pertaining either directly or indirectly to the sub-
 ject of insanity, other than the usual dry details which
 cover the operations of the Retreat during the year, would
 be considered by your honorable Board, as coming with-
 in the province of such a Report as this. Following the
 plan hitherto adopted, I propose to present some consid-
 erations of a somewhat general character in reference to
 some of the causes of insanity and its management.
 As this report is likely to be read by a considerable num-
 ber of those who have only the most indefinite views con-
 cerning those causes which operate so potently in this
 direction, perhaps I can not do better than to present the
 details of two or three cases which have come under
 observation during the past year as preliminary to more
 general remarks.

Mrs. M., aged forty-four years, the mother of eight chil-
 dren, was admitted to the Retreat in the month of January,
 affected with acute mania. The husband, when asked if
 he could suggest any cause or causes of her illness, ex-
 claimed with much animation that he could not conceive
 of any reason why she had become ill: "Her is a most
 domestic woman; is always doing something for her chil-
 dren; her is *always* at work for us all; *never* goes out of
 the house, even to the church on Sunday; her never goes
 gadding about at the neighbors' houses, or talking from
 one to another; her always had the boots blacked in the
 morning; her has been one of the best of wives and
 mothers, and was *always* at home."

This appreciative husband could hardly have furnished
 a more graphic delineation of the causes of his poor wife's
 illness if he had understood them never so thoroughly.
 I allude to the case as a type of many, and to the hus-
 band's statement as evincing how thoroughly ignorant
 many people, who are thrifty in worldly matters, may

be as to the primary conditions of mental health. This woman's utter disregard of the simplest laws of health had rendered her in her husband's eyes chief among women; had raised her so high on the pedestal of housewifery that he could not conceive how it was possible for such a model of excellence ever to become insane. If, however, she had committed a few of the sins which were so heinous in her husband's sight; if she had gossiped more, if she had broken away from the spell of husband and children, forced herself from that ceaseless round of household care and duty; if she had taken herself out of doors, and into the pure air and sunshine of heaven, even at the expense of much tattle and large gossip, and, if need be, at the expense of less cleanly floors and *boots*, and an occasional tear in her husband's shirt, or children's frocks, the probabilities are largely indicative that she would never have come to the Retreat, insane.

This case, so homely in its presentation, is one representative of many, especially of those who live in the country portions of New England, a little more pronounced in character perhaps, and a little more exaggerated in detail, but nevertheless it exhibits how insensibly and slowly operate many of the influences which ultimately land victims in institutions for the insane. The current of thought and care have gone on day after day, and month after month, from early morning until late at night in one ceaseless round; wakeful and anxious often for children sick, for children to be clothed and fed and schooled, anxious in reference to the thousand and one household cares that never lift from the brain of such a mother; with no intellectual or social world outside the dark walls, and many times illy-ventilated rooms of her own house; with no range of thought on outside matters, with no one to interpose or even to understand the danger,

no books to read, or if she had no time to read them. in short, no vision for time or eternity beyond one unending contest with cooking and scrubbing and mending, what wonder that the poor brain succumbs! The wonder, rather, is that it continues in working order so long as it does, without becoming utterly wrecked. More fresh air, more change, more holidays; more reading, more gossiping, more of almost anything to break the spell which so holds these poor women, and lead their minds in pastures more green, and by rivers of less stagnant and bitter waters.

But this class of causes does not operate alone in the case of housewives, or with those who do physical labor. They produce their effects no less surely in the case of men engaged in intellectual pursuits.

The Rev. D. S. S. was admitted during the last year to the Retreat, and his case presents a good illustration. Born of healthy parents, and inheriting a strong, vigorous body and mind, he should have lived in health until three-score and ten; instead, he is now a mental wreck, and in all probability will always remain so. He graduated after close application in college, with a high stand in scholarship, studied theology with much zeal under instructors eminent in attainments, and entered the ministry with a high ambition. Loving books, and writing most carefully his sermons, he felt the need of nothing outside his daily and weekly duties, which he followed for years with little or no change. If his brain had been constructed of tougher material, if his imagination had been less brilliant, he might have gone on for years without danger, but, as the case stood with him, the very fineness of his brain organization only hastened the time when it should become worthless. By his ignorance and consequent disregard of the simplest laws of mental health, which absolutely demand *change and variety* more urgently than any

other portion of the system, he followed in the long line of hosts of other men who have had a similar organization.

Another clergyman, the causes of whose illness were of a similar nature, has left the Retreat recovered within the last year. I might refer to the case of a lawyer, a man somewhat eminent in his profession, and for many years a judge, who, when his brain began to flag, and loiter amid the somewhat intricate mazes of his studies and practice, thought to goad it on to still further and greater effort by the use of stimulants, rather than by change and rest. The issue of such a course could but be plain, and certain, and not far off.

And these are educated men! If such things are done in the green tree, what shall be done in the dry?

These cases are sad enough, and when we remember how many there are every year, which arise in the midst of the ceaseless whirl and throb of the hurrying and contesting forces of our modern mode of life; when we remember how many young men and women are, every year, thrust out into combat with these conditions, with no preparation save such a smattering of books as they may be able to get, while under the parental care, at the common school; when we remember how many come into the world inheriting a nervous system weak and depressed from experiences and habits of parents, it should not surprise us that diseases of the nervous system are on the increase. In my opinion they will continue to increase until society learns more definitely and fully the laws which govern mental health. That the prospect of this, however, is not very immediate, I think may be inferred from the two following extracts, which are taken from articles which have recently appeared in leading periodicals.

“Asylums, constructed and furnished at an expense unparalleled in the world, and consigned to the almost

absolute control of asylum doctors and trustees, have utterly failed to check the disease. * * * Year by year, since their completion, insanity has more frequently blighted our children, more broadly stricken middle life, more irresistibly tended to become chronic, more rapidly and certainly carried its victims to the grave."*

"Once it was thought that lunatic hospitals would do a great deal to check insanity, but in this the public has been disappointed. While many recoveries and deaths are reported every year, still this unfortunate class increases more and more. The census of 1870 afforded positive proof that the insane, in Massachusetts increased there faster than the population; there is no doubt but the census of 1880 will show a still greater increase. It is very evident, if the disease is to be checked, resort must be had to other agencies than lunatic hospitals to do it."†

That any intelligent and highly-educated person should for one moment suppose that any number of hospitals, erected for the care and treatment of the insane, would "check" the progress of the disease, unless insanity is contagious, is certainly remarkable enough; but that a physician, and one who has long held the position of a writer on this and other subjects pertaining to disease should so far forget the first principles of his profession as to write such a paragraph as the above is indeed astonishing. That some persons, in the early days of hospitals for the insane, whose knowledge of the subject was limited to the few cases which had, perhaps, been confined in some out-houses in the neighborhood, or left to wander about the country, the objects of jests and ridicule, should have supposed that, if they were sent to hospitals for care

* Derman B. Eaton, North American Review, March, 1881.

† Nathan Allen, M.D., LL.D. The Sanitarian.

or cure, there would somehow follow such beneficent results as to prevent others from becoming insane, is quite possible; but that the fact that this has not been the result should be considered of sufficient importance, by the Commissioner of Public Education and an ex-Commissioner in lunacy for a great State, to be advanced as a kind of accusation against or semi-condemnation of the whole system—hospitals, physicians, and trustees—is, perhaps, curious enough to warrant attention.

It is not, however, easy to understand what any number of hospitals could effect towards diminishing the causes of insanity, or those of any other disease, and, to us, it would seem no more unreasonable to suppose that the erection of costly hospitals for the cancerous, or the phthisical, or for persons affected with rheumatism, would check these diseases. If every insane person who shall be sent to hospitals during the next year should recover, there would be an equal number to take their places, and more than an equal number; and, besides, it is a general rule, with few exceptions, that persons who have once passed through the experience of a severe illness never are in quite as perfect a state of health afterwards. and, in reference to insanity, this is especially true. Every one who has once been affected is more likely to be so again; so that the very fact that from thirty to fifty per cent. of the insane recover once renders the probability of larger numbers hereafter probable.

The only way, therefore, in which hospitals for the insane, or for those with any form of disease, not contagious, could "check" the number of cases which occur and call for treatment, would be by having the deaths equal the admissions. In this way there would be no re-admissions. This method would be efficient, without doubt, but the probabilities are that such results were not

those anticipated by the persons who sought to care for this unfortunate class of the community, by the erection of hospitals.

The truth is, that insanity, and every other form of disease, exists as a consequence of the violations of the laws of health, either directly or indirectly (or from other influences over which persons can have little or no control), and so long as people press on regardless of these laws, or in ignorance of them, so long will they suffer the penalties therefor.

There is, however, this difference between the causes of insanity and those of many other forms of disease, that they are more slow in their progress and more insidious in their operation; they more often reach back of the individual himself to the conduct and experiences of long lines of ancestors, so that a very large per cent. of those affected with it come into the world with the taint ingrained in the texture of the brain at the start.

Nevertheless, to others than physicians, it might seem that those who have for years made insanity a study should have some definite measures of prevention to be imparted to those eagerly waiting for them. The subject, however, is a many-sided one, and grave, if not insurmountable, difficulties surround it.

Yet it would not be the part of wisdom to sit with folded arms, or consume our energies in attempts to realize these difficulties; nor must we be content, as heretofore, to too large an extent, with efforts to care for the presence of the disease, but rather press forward in the line of effort to discover, if possible, the principles of mental hygiene, and aid in their introduction to practice in society.

I take it for granted that the articles from which the above extracts are taken, unsatisfactory as they are in many respects, as also other writings which have recently appeared in medical and literary journals, are indications that the importance of this subject, in the preventive as-

pects of it, is beginning to impress itself upon the public as well as upon the professional mind. There can be no doubt that heretofore there has been too little interest on the part of both; a too great readiness to keep at a distance and leave the whole matter in the hands of the few; there has too long existed an apathy in reference to ascertaining those conditions of the nervous system which underlie the prevalence of the disease, and systematic efforts to avoid them. While recognizing the claims which those who are so unfortunate as to lose their reason have upon the public; while a most generous readiness to respond in the way of lavish expenditure of money in providing for their care has been manifest, yet, we must recognize the fact that there has in this country been done very little towards aiding society to understand and avoid such errors of conduct, in reference to education in its broadest sense, and such abuses growing out of the common customs and habits of life as render the nervous system more liable to disease. While so generously acting in the former line of procedure, it would have been large economy not to have neglected the latter. *Prevention* is the watchword which is being signaled all along the line of the medical profession to-day concerning the management of diseases. State boards of health have been appointed in many of the larger States, which yearly issue volumes, containing more or less full accounts as to the results of observations made in reference to the prevalence of diseases and the public health.

Boards of
health.

A national board has also been appointed for similar purposes. I would suggest the importance of appointing on such boards one or more physicians, who are qualified for such a position, whose special duty it shall be to ascertain the prevalence of such conditions as conduce to the production of *mental* disease, and that the public have the benefit of such observations and conclusions as they

may be able to make. That such persons, so appointed, and operating in conjunction with the superintendents of public institutions, would be able to accomplish a most interesting and highly valuable work, in reference to the conduct of education, in our public schools, and in educating the public mind in reference to those habits of life which are at variance with mental health, I have no doubt; and I have as little doubt that a generous expenditure of money for such a purpose would, in the end, prove to be the wisest economy. That there exists the necessity for some such action on the part of the public, if we are to do anything efficient for staying the progress of mental disease, there can be no doubt.

It is not necessary in this place to discuss the much mooted question as to whether the increase of insanity is *real* or only *apparent*; the fact is patent enough that with all our endeavors, and lavish expenditures, we fail to provide suitable accommodations for the large numbers who require them; the fact is patent enough that those conditions of society which tend to the production of nervous disease are more and more increasing year by year, while it is equally true that little has been done towards understanding and preventing these conditions. That they pertain more especially to the methods and conduct of modern civilization is proved by the fact that they are limited to no one locality or country.

From the last Report of the Board of Commissioners in Lunacy for England, we learn that there has been a considerably uniform increase in the numbers of the pauper insane in England during the last twelve or fifteen years, and this, notwithstanding the fact that the number of this class of persons has diminished nearly one-half within that time, and also the fact that in no country in the world has there existed a broader charity in the methods of providing and caring for those who have become insane.

I think it is apparent, therefore, that if we are to do much of actual service in the cause of the insane beyond what is now being done, we must enter on some other and more radical measures than have been heretofore adopted. It will not suffice to abuse or ridicule present institutions and appliances, or try to bring them into public contempt, at least until we have something better to substitute in their place. It will not avail to endeavor to create public distrust, and thereby encourage the rendition of large numbers of the poor insane to the miserable keeping of alms-houses and county poor-houses. It is not readily perceived how very much in the way of advance in this cause is to be made by intimations that those who have the care of institutions and of the insane are incompetent, at least while institutions are months without superintendents, nor until it is apparent that others more competent are ready to assume such positions; nor do I perceive how it will avail much towards lessening the numbers of the insane to appoint boards of visitors composed of persons who know practically or theoretically little or nothing concerning the subject of insanity, whose duty it shall be to visit institutions, converse with patients, and report upon their management.

I believe it will be necessary to go deeper, and lay broader foundations; let there be added to the State boards, as a beginning in this direction, persons who have made highest attainments in the study of nerve-degeneration and its causes, those who have had largest success in the study and management of mental diseases: let there be compensation sufficient to secure such talent, and we may hope for results which will return a large per cent. of interest in the way of *prevention*. Such persons only, can speak with authority, can have influence with school-teachers and school-boards and public officers. They, more perfectly and surely than any others, can point

out the dangers which lie in methods of present management in educating and preparing the young for the duties and responsibilities of life. Such persons only, can wisely direct in laying the broadest and most secure foundations on which to rear the fabric of strong and vigorous mental health.

One of the most important events which has occurred The Cottage. during the year has been the erection of a beautiful cottage on the southern portion of our lawn by the Hon. I. Luther Spencer of Suffield, Conn. It contains six rooms, a bath-room, kitchen and closets, and has a cellar of seven feet depth, extending under the entire building; also a piazza on three sides, to which one can pass from the three rooms of the first floor. From this piazza, the view in all directions is as delightful, I think, as that of any private residence in New England. The architect and builder, Mr. J. C. Mead, has certainly presented an admirable plan for such a building, and has done the work in a very faithful manner. The walls of the rooms have been painted, the cellar has been cemented, and water, gas, and steam-pipes have been introduced through the building. Mr. Spencer has furnished the rooms throughout with appropriate furniture, and the cottage, in all respects, presents the appearance of a private residence. There are generally present in institutions of this kind a few patients who, during some period of their disease, at least, can be cared for with a larger degree of comfort and satisfaction to themselves, in such a residence as the above, than when associated in large halls with a considerable number of others. For such persons this beautiful and generous gift of Mr. Spencer will, I trust, prove a source of much comfort and satisfaction in the future.

An under-ground passage-way from the Retreat to the cottage has been constructed in which are laid the steam, water and gas-pipes, and through which a small car passes

to and fro, by means of which all food and dishes can be sent in either direction within a few seconds. A speaking-tube is also laid between the two buildings, so that communication is had as readily as if under one roof.

Periodicals.

It has given me much pleasure to be able in years past to acknowledge the reception of books, magazines, and newspapers, for the use and enjoyment of many of the patients, from a "Friend," whose modesty equals his generosity. This year he has presented books, the cost of which has been about one hundred and fifty dollars. He has contributed seventy dollars for music and musical appliances for an orchestra, and thirty dollars for our Fourth of July entertainment. He has distributed regularly, eight numbers of the Harpers', four of the Atlantic, three of the Scribner, two of Frank Leslie's Popular Monthly, and one each of Arthur's, Appleton, and Peterson's; also six daily newspapers, and four weekly, besides in various other ways testifying his deep interest in and appreciation of charity-work done yearly by the Retreat.

Thanks are also due two of our Directors, Mr. Mark Howard, for fifty dollars contributed for the purchase of pictures for the walls of the ladies' billiard-hall, which have added much to its attractiveness as a place of resort and enjoyment for those who are in a condition to go there; and to Mr. Geo. P. Bissell for five dollars for the same object; also to Mr. S. R. McNary for a large and convenient stepping-stone for use at our west-side entrance.

Religious services.

Religious services have been conducted as usual during the year by our chaplain, the Rev. William Thompson, D.D., and have been attended by about the usual proportion of our patients. The Rev. W. F. Nichols of Christ Church, and the Rev. A. D. Miller of St. John's Church, both of this city, have officiated, conducting the exercises with the Episcopal form of worship, several times.

I desire to express my thanks to the Board of Medical

Visitors who have for many years so faithfully and efficiently discharged their duties in visiting every month, and inspecting the Retreat. Some of these gentlemen have come long distances, and, a part of the season, in inclement weather, and at no inconsiderable sacrifice of their private interests. They have thoroughly examined every portion of the institution in reference to hygienic conditions and all the appliances in use for the physical well-being and comfort of the patients. They have also taken the requisite time, and frequently with much annoyance and inconvenience, to fully inform themselves as to the mental condition of those persons who have imagined they are wrongfully detained at the Retreat, and therefore should be set at liberty. The general outcome of these examinations has, without exception, so far as I know, been favorable. When patients have had a full and free opportunity to converse with several physicians, not officially connected with the daily administration, and receive from them courteous and respectful attention, the effect has generally been good. If they have any considerable degree of reasoning power they can at least appreciate the disinterestedness of conclusions the nature of which is communicated by some member of the Board. I think that this has been the favorable result in an unusual number of cases during the past year, and desire in this place to express my full appreciation of the value of their labors, as well as of the interest so generously manifested by the inconvenience necessarily incurred in their discharge.

We have had our usual experience in reference to the Entertainments subject of entertainments, so far as they relate to the enjoyment and minister towards the recovery of patients. A good orchestra has been organized, from persons connected, in some capacity or other, with the institution, which, during the summer evenings, has provided musical

entertainments on the lawn, at which a large proportion of the patients could be present. They have also been able to contribute very essentially towards the pleasure of the assemblages in the Amusement Hall during the winter evenings. Dr. Page has had charge of the calisthenic exercises as during the year 1880. Having referred to the value and importance of this kind of exercise for patients, in my last year's report. I need not do so this year further than to indicate that my appreciation of its good effects has in no degree changed.

We are under special obligations to the following-named persons, who have contributed in various ways towards providing entertainments for the patients during the past year.

Mr. and Mrs. A. B. Bull, with Trinity College students, a burlesque, "Field of the Cloth of Gold;" Messrs. A. T. Mason and L. Washburn; Messrs. De Witt P. Preston, Edward J. Pearson, and Howard Fairbrother, and the Middletown General Hospital Company, for dramatic representations; Mr. E. N. Emmons, Mr. and Mrs. A. H. Lyman, for assistance in music; Mr. Charles Rustemeyer, for use of carriages at various times; Mr. C. W. Huntington and North Baptist Church Choir; Mr. Edmund Severns and his class of young pupils, for concerts; the Rev. W. L. Gage, D.D., for a lecture, and Mrs. Edna Chaffee Noble for readings at different times; the Hon. W. W. Eaton and Mrs. J. H. Sprague for reading matter and books; the editors of *The Connecticut Courant*, *The Connecticut Register*, *The Columbian Register*, and *The Philadelphia Telegraph*, for copies of papers.

Changes.

Our history during the year in reference to changes among officers and employees has been similar to that of last year. Our Second Assistant, Dr. George K. Welch, resigned his position, at the end of one year, for the purpose of entering on the general practice of medicine. He

has located in New Britain, and has the regards and best wishes of us all for his success in his new field of professional labor. Dr. H. S. Noble, who has had several years of extensive experience in the practice of medicine, now occupies the position of Second Assistant, and has shown much tact and skill in the discharge of his duties. Of attendants, two have been discharged for misdemeanors, and information has been sent to other asylums in New England.

Gentlemen, I am reminded that more than seven years Thanks. have passed since my appointment as Superintendent of the Retreat. With much doubt as to the wisdom of your selection, I hesitatingly accepted the position. That they have been seven years of much labor, anxiety, and care, I know; that they have been seven years of prosperity to the Retreat I think may be inferred from the condition which it presents to-day; that they have proved to be years of ministry in comfort and healing to many stricken brains and sorrowful hearts I hope has been apparent to all who have been familiar with the daily routine of our work. I desire to express my appreciation of the confidence manifested in me by the Board of Directors during these years, and the readiness with which such suggestions as I have had to propose have been acted upon.

To my assistants, Drs. Page and Noble; to the steward, matron, supervisors, and attendants, who have exhibited much interest in the successful conduct of the Retreat, and to whose efforts in this direction during the past year I am much indebted, I tender my thanks and assurances of appreciation.

H. P. STEARNS.

HARTFORD, CONN., March 31, 1881.

CHAPLAIN'S REPORT.

To the Directors of the Retreat for the Insane.

GENTLEMEN: At the close of another year your Chaplain recalls but few variations from the line of service indicated in previous reports; indeed, nothing that claims special notice.

Opportunities for conversation with the patients have been courteously afforded by the physicians in charge, and have proved, it is thought, not entirely futile.

The daily devotional service in Elizabeth Chapel continues to be attended by about the same proportion of patients as in previous years. The same may be said in regard to public worship, Sabbath afternoon. Both the daily and weekly gatherings have been enlivened, in recent months, by a fuller service of song than has sometimes been available.

It would be gratifying to your Chaplain were he able to report more satisfactory results of his labor than have been apparent; but he trusts that some bitter sorrows have been soothed, and hope kindled here and there, by a message from Him who gives beauty for ashes, the oil of joy for mourning, and the garment of praise for the spirit of heaviness.

Very respectfully yours,

WILLIAM THOMPSON.

April 13, 1881.

APPENDIX.

TABLE I.

MOVEMENT OF THE POPULATION.

	Males.	Females.	Total.
Number at the beginning of the year, -	68	75	143
Admitted in the year, - - - -	48	46	94
Re-admitted in the year, - - - -	12	8	20
Total admitted in the year, - - - -	70	54	114
Total present in the year, - - - -	128	129	257
Daily average for the year, - - - -	68	76	144
Discharged—Recovered, - - - -	18	18	36
Much improved, - - - -	1	1	2
Improved, - - - -	5	10	15
Stationery, - - - -	22	17	39
Died, - - - -	16	7	23
Total discharged in the year, - - - -	62	53	115
Remaining at the end of the year, - -	66	76	142

TABLE II.

NUMBER OF ATTACKS IN THOSE ADMITTED.

	WITHIN THE YEAR.			SINCE APRIL 1, 1845.		
	Male.	Female.	Total.	Male.	Female.	Total.
First, - - -	42	36	78	1,332	1,602	2,934
Second, - - -	6	10	16	302	449	751
Third, - - -	2	2	4	109	148	257
Fourth, - - -	..	..	..	44	82	126
Fifth, - - -	1	1	2	24	52	76
Sixth, - - -	..	..	..	20	29	49
Seventh, - - -	..	..	..	10	19	29
Eighth, - - -	1	..	1	6	11	17
Ninth, - - -	..	..	..	2	6	8
Tenth, - - -	..	..	..	2	2	4
Eleventh, - - -	..	..	..	1	1	2
Twelfth, - - -	..	..	..	1	2	3
More that twelve,	..	..	..	..	7	7
Several, - - -	8	5	13	183	143	326
Unknown, - - -	..	..	..	123	165	288
Total, - - -	60	54	114	2,159	2,668	4,827

TABLE III.

NUMBER AT EACH AGE WHEN ADMITTED.

	IN THE YEAR.			SINCE APRIL 1, 1844.		
	Male.	Female.	Total.	Male.	Female.	Total.
Under 15 years, -	..	..	..	15	10	25
15 to 20 " -	3	..	3	144	137	281
20 to 25 " -	5	3	8	289	337	626
25 to 30 " -	6	5	11	258	373	631
30 to 35 " -	10	5	15	276	353	629
35 to 40 " -	6	11	17	247	337	584
40 to 45 " -	6	9	15	235	307	542
45 to 50 " -	3	5	8	183	237	420
50 to 60 " -	11	9	20	301	366	667
60 to 70 " -	4	6	10	166	187	353
70 to 80 " -	5	..	5	81	45	126
Over 80 " -	1	1	2	10	9	19
Unknown, -	..	..	..	12	17	29
Total, - -	60	54	114	2,217	2,715	4,932

TABLE IV.

DURATION OF INSANITY BEFORE ENTRANCE OF THOSE ADMITTED.

	IN THE YEAR.			SINCE APRIL 1, 1844.		
	Male.	Female.	Total.	Male.	Female.	Total.
Less than 1 month, -	16	14	30	502	668	1,170
1 to 3 months, -	18	12	30	434	569	1,003
3 to 6 " -	4	5	9	292	360	652
6 to 9 " -	1	3	4	151	178	329
9 to 12 " -	2	5	7	85	85	170
12 to 18 " -	1	2	3	121	145	266
18 to 24 " -	2	..	2	79	59	138
2 to 3 years, -	2	2	4	137	153	290
3 to 5 " -	8	3	11	115	140	255
5 to 10 " -	2	2	4	124	137	261
10 to 15 " -	1	3	4	40	54	94
15 to 20 " -	2	..	2	37	42	79
20 to 25 " -	..	..	..	15	28	43
25 to 30 " -	..	..	..	2	4	6
Over 30 years, -	..	1	1	4	6	10
Unknown, -	1	2	3	77	85	154
Not Insane, -	..	..	..	2	2	4
Total, - -	60	54	114	2,217	2,715	4,932

TABLE V.

CIVIL CONDITION OF THOSE ADMITTED.

	IN THE YEAR.			SINCE APRIL 1, 1843.		
	Male.	Female.	Total.	Male.	Female.	Total.
Single, - - -	23	18	41	1,150	1,157	2,307
Married, - - -	32	26	58	1,074	1,289	2,363
Widowed, - - -	3	9	12	125	360	485
Divorced, - - -	2	1	3	6	11	17
Unknown, - - -	..	..	..	3	7	10
Total, - - -	60	54	114	2,358	2,824	5,182

TABLE VI.

FORM OF DISEASE IN THOSE ADMITTED.

	IN THE YEAR.			SINCE APRIL 1, 1869.		
	Male	Female.	Total.	Male.	Female.	Total.
Mania Acute, -	25	17	42	164	154	318
“ Chronic, -	9	11	20	99	147	246
“ Epileptic, -	2	..	2	15	7	22
“ Puerperal, -	..	1	1	..	39	39
“ Suicidal, -	..	..	..	..	2	2
“ Homicidal, -	..	..	..	2	1	3
“ Periodical, -	..	1	1	22	32	54
Melancholia Acute, -	11	13	24	109	109	218
“ Chronic, -	2	5	7	50	67	117
“ Attonita, -	..	..	..	..	4	4
General Paresis, -	..	1	1	24	4	28
Methomania, -	4	2	6	70	19	89
Dementia Acute, -	..	..	..	7	4	11
“ Chronic, -	..	..	..	20	14	34
“ Senile, -	4	1	5	15	7	22
Imbecility, -	1	..	1	6	..	6
Moral Insanity, -	..	1	1	6	3	9
Folie Circulaire, -	2	1	3	2	1	3
Not Insane, -	..	..	..	2	2	4
Unknown, -	..	..	..	2	1	3
Total, - - -	60	54	114	615	617	1,232

TABLE VII.
DEATHS AND THE CAUSES.

	WITHIN THE YEAR.			SINCE APRIL 1, 1869.		
	Males.	Females.	Total.	Males.	Females.	Total.
Apoplexy, - -	2	..	2	5	7	12
Abscess, - -	..	..	..	..	1	1
Brain Disease, Organic, - -	6	1	7	14	2	16
Bright's Disease, -	1	..	1	2	1	3
Cancer, - -	..	..	..	..	1	1
General Paresis, -	1	..	1	25	3	28
Heart Disease, -	..	..	..	2	..	2
Acute Mania Exhaustion, - -	3	1	4	14	17	31
Chronic Mania Exhaustion, - -	..	1	1	14	15	29
Inanition, - -	..	1	1	2	2	4
Melancholia and Exhaustion, - -	..	1	1	2	3	5
Meningitis, - -	..	..	..	2	1	2
Paralysis, - -	..	..	..	3	6	9
Phthisis, - -	..	..	..	1	5	6
Prostatitis, - -	..	..	..	1	..	1
Rheumatism, - -	..	..	..	1	..	1
Accident, - -	..	..	..	1	..	1
Senile Decay, - -	3	1	4	15	6	21
Suicide, - -	..	1	1	5	3	8
Typhoid Fever, - -	..	..	..	1	..	1
Typho-Malarial Fever, - -	..	..	..	1	..	1
Typhomania, - -	..	..	..	1	..	1
Uraemia, - -	..	..	..	1	2	3
Puerperal Mania, -	..	..	..	..	6	6
Undetermined, -	..	..	..	..	2	2
Total, - -	16	7	23	118	83	196

TABLE VIII.

AGES AT DEATH.

	WITHIN THE YEAR.			SINCE APRIL 1, 1869.		
	Male.	Female.	Total.	Male.	Female.	Total.
Under 15 years, -	..	..	..	..	..	..
15 to 20 years, -	..	..	..	1	1	2
20 to 25 " -	1	..	1	3	2	5
25 to 30 " -	1	..	1	7	6	13
30 to 35 " -	5	..	5	9	6	15
35 to 40 " -	1	..	1	12	10	22
40 to 45 " -	..	1	1	14	8	22
45 to 50 " -	2	2	4	10	11	21
50 to 60 " -	2	1	3	22	19	41
60 to 70 " -	1	2	3	14	10	24
70 to 80 " -	2	1	3	18	9	27
Over 80 " -	1	..	1	3	1	4
Total, - -	16	7	23	113	83	196

TABLE IX.

OPERATIONS OF THE HOSPITAL FROM THE BEGINNING IN EACH YEAR.

YEAR.	ADMITTED.			DISCHARGED.												Daily Average Number.	
				Recovered.			Improved.			Stationary.			Died.				
	M.	F.	Tot.	M.	F.	Tot.	M.	F.	Tot.	M.	F.	Tot.	M.	F.	Tot.		Total.
1824-5			44			10											1
1825-6			33			16											1
1826-7			37			24											0
1827-8			40			27											4
1828-9			42			26											2
1829-30			51			28											0
1830-1			53			32											1
1831-2			80			40											6
1832-3			68			37											4
1833-4			72			43											3
1834-5			72			36											6
1835-6			73			42											6
1836-7			91			55											6
1837-8			67			42											10
1838-9			94			49											8
1839-40			84			50											2
1840-1			67			38											9
Total.									231			92					
1841-2	45	51	96	27	29	56	6	10	16	6	3	9	8	2	8	7	
1842-3	50	33	83	26	19	45	11	13	24				4	3	7		
1843-4	51	29	80	26	18	44	26	17	38				5	4	9		84
1844-5	56	49	105	23	22	45	13	7	20	7	2	9	7	4	11		97
1845-6	56	72	128	24	36	55	17	15	32	9	3	12	5	11	16		121
1846-7	50	61	111	16	40	56	22	13	35	1	6	7	8	3	11		127
1847-8	39	54	93	12	28	40	13	11	24	7	6	13	4	8	12		127
1848-9	49	84	133	20	50	70	8	15	23	12	5	17	7	5	12		141
1849-50	60	75	135	17	47	64	11	13	24	3	4	7	17	13	30		143
1850-1	56	72	128	25	34	59	15	11	26	8	6	14	9	6	15		151
1851-2	68	90	158	26	42	68	10	12	22	7	15	22	9	13	22		168
1852-3	66	74	140	32	32	64	18	22	40	13	13	26	10	11	21		179
1853-4	74	103	177	22	42	64	16	26	42	14	19	33	13	9	22		180
1854-5	69	100	169	26	47	73	20	18	38	18	16	34	9	8	17		185
1855-6	70	87	157	18	41	59	17	28	45	10	13	23	12	14	26		187
1856-7	73	88	161	34	37	71	19	26	45	14	8	22	5	9	14		204
1857-8	67	77	144	16	32	48	22	15	37	20	22	42	6	9	15		199
1858-9	63	78	141	25	36	61	11	23	34	17	12	29	7	3	10		216
1859-60	80	88	168	34	36	70	22	15	37	11	18	29	9	11	20		219
1860-1	66	98	164	28	47	75	17	37	54	16	11	27	5	4	9		225
1861-2	79	92	171	29	42	71	32	28	60	15	13	28	7	10	17		222
1862-3	79	91	170	32	40	72	20	25	45	6	9	15	14	14	28		222
1863-4	60	83	143	26	46	72	15	22	37	3	10	13	11	10	21		228
1864-5	74	81	155	27	30	57	21	24	45	11	8	19	13	14	27		255
1865-6	69	96	165	20	42	62	17	31	48	14	8	22	12	14	26		233
1866-7	67	115	182	29	61	90	21	26	47	10	11	21	15	14	29		238
1867-8	72	101	173	30	42	72	23	41	64	7	7	14	6	11	17		241
1868-9	39	90	129	15	45	60	25	43	68	46	49	95	7	10	17		184
1869-70	62	61	123	18	23	41	21	26	47	9	2	11	14	11	25		137
1870-1	63	80	143	16	30	46	22	17	39	9	5	14	9	12	21		151
1871-2	58	57	115	30	26	56	24	20	44	5	5	10	9	15	24		147
1872-3	61	53	114	24	21	45	11	19	30	10	9	19	8	2	10		143
1873-4	54	29	83	18	13	31	22	19	41	14	13	27	6	5	11		132
1874-5	31	47	78	22	9	31	8	4	12	9	5	14	8	4	12		124
1875-6	42	61	103	19	23	42	4	15	19	4	19	23	0	9	9		133
1876-7	45	47	92	16	17	33	12	11	23	10	17	27	9	2	11		137
1877-8	41	48	89	17	17	34	5	15	20	14	12	26	9	6	15		131
1878-9	33	45	78	9	16	25	6	7	13	7	13	20	12	6	18		130
1879-80	66	34	100	23	10	33	9	7	16	12	13	25	13	4	17		133
1880-1	60	54	114	18	18	36	6	11	17	22	17	39	16	7	23		144

ADMISSION OF PATIENTS

INTO THE

RETREAT FOR THE INSANE AT HARTFORD.

No patient admitted for a shorter time than three months; and payment for *that term only* is to be made in *advance to the Steward or Treasurer*.

Subsequent expenses are to be paid quarterly to the *Steward*.

If the patient is removed *uncured* before the expiration of thirteen weeks, and contrary to the advice and consent of the Superintending Physician, board is always required for that period; but if the patient recovers before the expiration of the period paid for, or leaves with the full approbation of the physician, the excess is refunded.

Letters relating to the quarterly bills and clothing should be addressed to Rev. G. E. SANBORNE, the Steward. Clothing and packages sent for the use of the inmates should be sent to the care of the Steward.

All letters in relation to the situation and health of the patients, etc., will, of course, be addressed to Dr. HENRY P. STEARNS, the Superintendent.

Application for admission should be made to Dr. Stearns, Superintendent, *previous to the patient's being brought to the Retreat*, in all cases. A brief statement of the case should accompany the application.

[*Extracts from the Law passed at the last (1869) Session of the Legislature.*]

“SECTION 1. Any lunatic or distracted person may be placed in a hospital, asylum, or retreat for the insane, or other suitable place of detention, either public or private, by his or her legal guardian, or relatives or friends in case of no guardian; but in no case without the certificate of one or more reputable physicians, after a personal examination made within one week of the date thereof, which certificate shall be duly acknowledged before some magistrate or other officer authorized to administer oaths, or to take the acknowledgment of deeds in the State where given, who shall certify to the genuineness of the signature, and to the respectability of the signer.”

Form of Certificate and Request, which the friends and patients are requested to present with the application for admission.

REQUEST FOR ADMISSION.

(To be signed by a guardian, near relative, or friend.)

I request that M———, of———, may be admitted as a patient into the Retreat for the Insane. ————
 ————, 188 .

CERTIFICATE OF PHYSICIAN.

I hereby certify that I have, within one week of this date, made personal examination of M———, of———, and believe h—to be insane.
 ————

Subscribed, sworn to, and duly acknowledged by the said——— before the subscribing authority———, of———, and I do hereby certify that the subscriber to the above certificate is a respectable physician, and his signature above is genuine. ————
 ————, 188 .

FORM OF BOND.

Upon the admission of ——, of———, into the RETREAT FOR THE INSANE, at Hartford, I engage to provide or pay for a sufficiency of clothing for———use, and to pay to the Treasurer of the said Institution —— dollars per week for board, medicine, and medical attendance; and also to pay the expense of a separate attendant, if the Superintendent shall deem one necessary; to make compensation for all damage done by —— to the property of the Retreat; to pay reasonable expenses for pursuing in case of elopement; cause the said patient to be removed when discharged; and in event of death, to pay the expenses of burial.

———, *Principal.*

For the value received, I hereby engage to be responsible for the fulfillment of the above stipulations.

———, *Surety.*

HARTFORD, Conn.,———, 188 .

Approved by ——

FORM OF REQUEST.

ITEM. I give and bequeath to the PRESIDENT AND DIRECTORS OF THE RETREAT FOR THE INSANE, in the city of Hartford, the sum of ———dollars, to be paid by my executors out of my real and personal estate, as soon as the settlement of my affairs will permit, to the Treasurer of the said Institution, for the time being, in trust, to be applied by the Directors thereof to the humane purposes of said Institution.

VISITORS.

The Managers of the Institution, aware of the interest generally felt in its prosperity, which is naturally connected with a desire to visit its inmates and inspect its internal arrangements, are convinced that the welfare of the patients and the duties of its officers require that such visitations should be subject to the following regulations:

I. The Institution will be open for visitors (Sundays excepted) from two to four o'clock in the afternoon.

II. All visitors, except persons having business at the Retreat, will be required to provide themselves with tickets for admission from the Managers or the Treasurer, either of whom will grant the same, unless their knowledge of circumstances make it, in their judgment, necessary to refuse.

MANAGERS.

WM. R. CONE, Ætna Bank.

CALVIN DAY, 55 Spring street.

G. W. RUSSELL, 490 Main street.

TREASURER.

THOMAS SISSON, 259 Main street.

FIFTEENTH ANNUAL REPORT
OF THE
SHEFFIELD SCIENTIFIC SCHOOL
OF
YALE COLLEGE,
1880-81.

PRINTED BY ORDER OF THE GENERAL ASSEMBLY.

NEW HAVEN:
TUTTLE, MOREHOUSE & TAYLOR.
1881.

State Board of Visitors.

CONSTITUTING, WITH THE SECRETARY OF THE SCHOOL, THE BOARD
FOR THE APPOINTMENT OF STATE STUDENTS.

GOVERNOR.

HIS EXCELLENCY CHARLES B. ANDREWS, Litchfield.

LIEUTENANT-GOVERNOR.

HIS HONOR DAVID GALLUP, Plainfield.

STATE SENATORS.

HON. LYMAN W. COE, Wolcottville.

HON. CHARLES R. FAGAN, Middletown.

HON. WILLIAM BROWN, Waterbury.

SECRETARY OF STATE BOARD OF EDUCATION.

REV. BIRDSEY GRANT NORTHROP, New Haven.

Councillors.

APPOINTED BY THE CORPORATION OF YALE COLLEGE.

HON. JAMES E. ENGLISH, New Haven.

HON. MARSHALL JEWELL, Hartford.

HON. JOSEPH R. HAWLEY, Hartford.

HON. OLIVER F. WINCHESTER, New Haven.

JOSEPH E. SHEFFIELD, Esq., New Haven.

PROF. JAMES D. DANA, LL.D., New Haven.

HENRY FARNAM, Esq., New Haven.

M. DWIGHT COLLIER, M.A., St. Louis.

HON. WILLIAM E. DODGE, New York City.

SECRETARY AND TREASURER OF THE SCHOOL.

GEORGE J. BRUSH.

JANITOR OF SHEFFIELD HALL.

ANTON PFEIFER, 55 Lock street.

JANITOR OF NORTH SHEFFIELD HALL.

GEORGE W. STODDARD, 82 Mansfield street.

REPORT

OF THE

STATE BOARD OF VISITORS.

To the General Assembly :

The State Board of Visitors of the Sheffield Scientific School have the honor herewith to transmit, for the use of the Legislature, the fifteenth Annual Report of the Governing Board of that institution. Every member of the Legislature will doubtless examine the report sufficiently to learn its general import. It will be seen that the scope of the educational work which is being carried on by this School is substantially the same as for the two or three preceding years. We bear cheerful testimony to the zeal and fidelity with which the entire corps of teachers have discharged their labors. The great value of their work cannot be easily estimated. Nowhere in the State, if in the whole country, are the practical, working sciences, out of which comes the comfort, prosperity and wealth of the New England people, better taught than here.

We call attention to the Horological and Thermometric Bureaus which have been established since the last report.

The School is in a high state of prosperity; the number of students is largely increased, and there seems a greater desire to obtain the free scholarships.

Intellectual research is extending more and more into those fields where truth can be tested by ordeal. Dogmatism is falling into disfavor and the Experimental Sciences are becoming more popular. These are results which naturally flow from that condition of society in which the largest personal freedom unites with the widest liberty of opinion and the most intrepid spirit of inquiry. The Sheffield Scientific School is the outgrowth of such a condition. Its very existence proves that ours is a free government. Its growing strength and prosperity gives assurance that a free government cannot soon fail. We commend it to the favorable consideration of the General Assembly.

By order of the Board.

CHARLES B. ANDREWS,

Chairman.

ANNUAL STATEMENT

OF THE

GOVERNING BOARD.



IN presenting their Fifteenth Annual Report the Governing Board of the Sheffield Scientific School have no changes of moment to record. The number of students has increased materially over that of the last year: but the future alone can decide whether this is due to accidental causes, or to the reviving interest in scientific studies which owes its origin to the reviving prosperity of the country. In the internal history of this institution there has been but little variation. The courses of instruction can undergo but little alteration, so long as their present means only are at the disposal of the Governing Board, and improvements, which it is desirable to make, must be deferred to a period when the resources of the School have been increased sufficiently to justify their introduction.

It is with regret that the Governing Board are compelled to mention the loss of one of the warmest friends of the School, the Honorable Oliver F. Winchester, who died at his residence in this city, on Friday the tenth of December, 1880. The attention of Mr. Winchester was early directed to the desirability of establishing this department of Yale College on a secure basis, and as far back as 1855 he subscribed five thousand dollars towards the sum which those interested in it were then seeking to raise for its endowment. Nor did his interest so early manifested ever abate, and in recognition of this fact he was made one of the Councillors of the School upon its reorganization in 1869. More recently his regard for science and scientific instruction has been signally manifested by the large gift he made of land to the College for the purpose of founding the observatory, which has been called from his name. Though under special trustees of its own, and therefore not directly connected with the Scientific School, its

aims are in many respects so alike that its developments and growth must necessarily be attended with more especial benefit to this department than to most of those allied under the name of Yale College.

WINCHESTER OBSERVATORY.

HOROLOGICAL AND THERMOMETRIC BUREAUS.

1. The Horological Bureau continues to occupy the room in North Sheffield Hall, which it rents for a computing and clock-room. This room contains, besides a Bond's Chronograph, three standard clocks of the highest grade, mounted on separate piers, in closets with non-conducting walls for protection against sudden changes of temperature. These clocks, together with another in a room near by, and the tower clock of the City Hall (connected electrically with a sounder in the clock room), are compared daily and tested for rate by observations made in the special observatory of the Bureau. From one of these—the standard mean time clock by Howard,—the exact time is regularly distributed by telegraph to various offices in the city and to the chief railroads of the State. The railroads at present thus directly served are the New York, New Haven & Hartford, the Boston & New York Air Line, the Connecticut Western, the Connecticut Valley, and the Naugatuck. Other railroads obtain their time from these.

The standard of time adopted is that of the meridian of the New York City Hall, which is slow of Boston $11^m 46^s.3$, and of New Haven (Hor. Obs.) $4^m 19^s.58$, and is fast of Washington $12^m 10^s.5$.

The City Hall Clock, (a fine one by Howard, with Denison gravity escapement and a three hundred and fifty pound mercurial two-second pendulum,) is connected, as above stated, with the clock room of the Bureau, and proves to be comparable for steadiness of rate with standard astronomical clocks of the first class. Its error is generally less than one second, and is not allowed to exceed two or three seconds at a maximum. Its daily variations of rate are very small fractions of a second. The *first* stroke of the bell marks the precise beginning of each hour—an allowance of course being made for the velocity of sound, of one second for every seventy rods that the observer is distant from the City Hall.

One of the three standard clocks mentioned above was pre-

sented to the Bureau early in the year by its maker, Dr. William Hillhouse of New Haven, who also gave many years ago the fine transit instrument by Troughton, now used in the Observatory of the Bureau. This clock is of the finest workmanship, has a double three-legged Denison escapement, and a mercurial compensation pendulum of the unusual weight of about sixty-five pounds. Its performance is very satisfactory, though it has not yet been fully investigated.

The testing of fine watches, both for manufacturers and individuals, under the regulations published in the circular of the Bureau, which was given in the last Report, has been successfully carried on during the year at the vaults of the New Haven Safe Deposit Company, where the time pieces are deposited for safe keeping, and where also there is a chronograph electrically connected with the standard mean time clock for facility in rating, as well as the hot and cold closets for testing the effects of temperature.

In May and June a systematic series of telegraphic observations was undertaken on several nights by Dr. Waldo at the Observatory of the Bureau and Prof. Wm. A. Rogers at Harvard College Observatory, for the exact determination of the difference of longitude between these points,—the observers interchanging places on half the evenings to eliminate the effects of personal equation. The Observatory is under obligations to the Director of the Observatory of Harvard College, Professor Pickering, and to the officers of the Western Union Telegraph Company, who have afforded every facility for the successful carrying out of the longitude determination.

The reduction of the observations has not yet been completed, but is well advanced.

Two students in practical astronomy have been employed in the computations and other work of the Bureau during the year.

Neither the time service nor the testing of watches, it may be proper to say, has thus far proved as remunerative as the large cost to the Bureau and the acknowledged benefit of these services to great public and private interests would lead us to expect, yet there is reason to believe that the importance of both is gradually becoming more and more appreciated, and that ultimately they will not fail of an adequate support.

The Time Service, especially, is of vital importance to the railroad interests of the State, and through them to the whole com-

munity, inasmuch as it promotes safety in the running of trains, and secures in all places accurate and uniform time. It is hoped, therefore, that the Legislature of the State, in view of the great public benefit of this service, will see fit to relieve the observatory of the expense of maintaining it.

Dr. Leonard Waldo is the Astronomer in Charge of the Horological Bureau, and with Mr. William Beebe as assistant, has the entire management of its affairs.

2. THE THERMOMETRIC BUREAU, also in charge of Dr. Waldo, is another branch of service undertaken recently by the Observatory. Its organization and purpose are fully explained in the following published circular, which is here inserted entire.

CIRCULAR CONCERNING THE VERIFICATION OF THERMOMETERS.

This Bureau has been established by the Corporation of Yale College, at the recommendation of the Board of Managers of the Winchester Observatory, in order to afford desired facilities for the adequate verification of thermometers.

Thermometers will be received by the observatory for the purpose of comparison with the observatory standards, and certificates of comparison signed by the Astronomer in charge will be issued with thermometers so compared. These certificates will contain a statement of the corrections to be applied at intervals of five or ten degrees of the thermometer scale to cause it to have the same reading as the observatory standards. In general these corrections will be expressed in tenths of one degree.

Thermometers sent for verification must have a name and number engraved upon them; and thermometers which are not graduated on the glass stem must be of sufficiently good workmanship to satisfy the observer in charge that the scale will not suddenly change with reference to the glass stem of the thermometer tube, with ordinarily careful usage.

The Board of Managers have established the following scale of charges for this service, which includes certificate:—

Standard Meteorological Thermometers with independent	
freezing point determination,-----	\$2.00
Standard Meteorological Thermometers,-----	1.00
Ordinary Meteorological Thermometers,-----	.50
Ordinary Maximum Thermometers,-----	.75
Ordinary Minimum Thermometers,-----	.75
Clinical Thermometers,-----	.50

There will be a deduction of one-fifth of the above charges where more than eight thermometers of one kind are received at the same time. In the case of clinical thermometers the charge will be four dollars per dozen when not less than two dozen are sent at the same time.

For other thermometers than the above the charges for verification will be furnished on application.

The letter of advice accompanying thermometers sent for verification should

contain the maker's name, the number of each thermometer, and full directions for reshipment.

All proper precautions are taken by the Board of Managers to guard against loss or injury; but as it is manifestly inexpedient that a University Corporation should be responsible for property in its care for such a purpose, it is to be understood that all risks are assumed by the person sending the thermometers.

LEONARD WALDO,

Astronomer in Charge.

Approved and ordered to be published by the Board of Managers of the Winchester Observatory.

C. S. LYMAN, *President.*

H. A. NEWTON, *Secretary.*

New Haven, Conn., June 1, 1880.

Statistics show that several thousand thermometers of refined construction, and graduated on the stem to 0°.2 F. or thereabouts, are annually procured by the medical practitioners of our country alone for physiological researches and daily practice. The majority of these thermometers are newly made (within six months), and their verification depends on inferior (from the scientific standpoint) thermometers in the hands of individual makers. It is needless to say that the readings of such thermometers have little value in indicating the true temperature of a patient, or affording data in cases which the physician wishes to describe in print.

The makers of thermometers in our country have been in general content to use for their standards, thermometers which have not been recently compared at a foreign observatory or with some more easily accessible instrument in which they place confidence, in the hands of a friendly neighbor. Thus it happens that many thousand American clinical thermometers have been sold, which do not depend upon a comparison with a recognized standard for their scale readings. The result has been that the American instruments have suffered in the estimation of scientific practitioners. This is not so much the fault of the American makers as their misfortune in not having the same facilities offered them by the properly equipped observatories this side of the water, which their favored competitors enjoy abroad.

The meteorological observers in this country have now no common standard of easy access; and it seems eminently proper that the observatory should undertake to be useful to the medical profession and the meteorologists in this country, and afford the means of comparison desired. With this end in view, the observatory has accepted the aid of the Board of Directors of the Bache Fund of the National Academy in obtaining the standards of the foreign observatories, and has made provision for the constant determination of the errors of the standards themselves.

In order to encourage the manufacture of thoroughly seasoned thermometers for physicians' use, the observatory will receive from the makers thermometer tubes which have been numbered but not graduated, and will seal such tubes in

boxes in such a manner that they can only be opened by breaking the seals. After not less than one year the boxes may be opened by an observatory officer, and in the certificates of verification furnished with these thermometers the length of time they have been under the observatory seal will be stated. The observatory charge for recording and sealing such thermometers will be \$1.00 per hundred, and makers desiring to avail themselves of this privilege will send such boxes to the observatory for sealing.

The observatory will make arrangements with hospitals and other institutions using a number of thermometers, for the systematic examination at stated intervals of all thermometers in their use. Such an arrangement precludes errors arising from the use of newly made instruments which have been verified, but whose scales have not yet attained an approximately permanent position.

Ordinary and clinical thermometers are returned within three days from the time of their reception, if the observatory charges for verification are remitted with the thermometers.

In case they are not so remitted, they are payable upon notification by the observatory that the thermometers are ready to be returned.

Dealers and manufacturers furnishing satisfactory references to the observatory may open an account, to be settled quarterly, beginning with January 1 of each year.

The Thermometric Bureau is under the immediate charge of Dr. Leonard Waldo. The observatory also receives the advice of Professor J. Willard Gibbs and Professor Arthur W. Wright in regard to problems connected with thermometry.

NOTICE.

To insure the safe transmission of thermometers by express, they should be packed in two boxes, one inside the other, and the space filled with cotton-wool or its equivalent. Single clinical thermometers may be packed in wooden boxes and sent by mail. New York makers desiring to send thermometers by hand may do so by leaving them with Lockwood's private express, care Oelschlaeger Bros., 162 William Street. The P. O. Address of the Observatory is Box 853. The Office is at 89 Orange Street, to which all packages may be directed.

The following standards will be used by this department of the Observatory for the verification of thermometers:—

DESIGNATION.	MAKER.	MAKER'S NUMBER.	HOW GRADUATED.	LENGTH OF 1°.	SMALLEST GRADUATION.	LENGTH OF TUBE.	SHAPE OF BULB.	REMARKS.
Standard Air Thermometer.								**
Primary Standard.	Kew Observatory.	585	-34° to +275° C.	1.73 mm.	1°	618 mm.	Cylindrical.	Kew Observatory, 1880. Filled in 1887.
"	Kew Observatory.	578	-9 to +105 C.	3.46 "	0.5	455 "	"	Kew Observatory, 1880. Filled in 1888.
"	Kew Observatory.	584	+14 to +220 F.	1.87 "	1	455 "	"	Kew Observatory, 1880. Filled in 1888.
"	Casella, London.	35247	+30 to +214 F.	1.33 "	1	390 "	"	Filled in 1867, Graduated 1879.
"	R. Fuess, Berlin.	89	-6 to +105 C.	4.15 "	0.1	650 "	"	Patent, 1877.
"	R. Fuess, Berlin.	50	-2 to +105 C.	4.05 "	0.2	573 "	"	Patent, 1877.
"	Baudin, Paris.		C.		0.1 and 0.2		"	**
"	Fastré Aîné à Paris.	*594	-13 to +85.6 C.	3.62 "	*	550 "	"	Filled in 1854.
"	Fastré Aîné à Paris.	*596	-35 to +84.2 C.	2.60 "	*	508 "	"	" 1854.
"	Tonnello à Paris.	2584 to 2587	+5 to +230 F.	1.8 "	0.5	455 "	"	" 1879-1.
Four Standards.	Casella, London.	35242	+10 to +215 F.	1.59 "	1	378 "	"	Filled in 1867. Graduated 1879.
Secondary Standard.	Casella, London.	35246	+27 to +212 F.	1.85 "	1	382 "	"	Filled in 1867. Graduated 1879.
"	Fuess, Berlin.	536 b.	-24 to +55 C.	2.44 "	0.2	302 "	Spherical.	
"	Greiner & Geissler, Berlin.	601	-19 to +45 C.	3.94 "	0.2	245 "	"	Date 1873 on the Scale.
"	Greiner & Geissler, Berlin.	503	-27 to +50 C.		0.2	298 "	"	Date 1852 on the Scale.
"	F. G. Greiner.	600	-1 to +27 R. F.	9.50 "	0.1	413 "	Cylindrical.	**
"	Baudin, Paris.				0.5		"	**
Comparison Thermometers.								
Twenty-Five.	Alvergniat Freres.	Various Numbers.	-20 to +133 F.	about 1.7 mm.	1	200 "	Spherical.	
Six.	Casella, London.	59	-8 to +105 C.	2.27 "	1	299 "	Cylindrical.	
One.	Fuess, Berlin.							**
—	Baudin, Paris.							**
Clinical Thermometers.								
Four.	Alvergniat Freres.	Various Numbers.	+80 to +136 F.	about 3.5 "	0.2	253 "	Cylindrical.	
Four.	Casella, London.	84 and 85	+26 to +46 C.	about 7.2 "	0.1	298 "	"	
Two.	Fuess, Berlin.	9738	-15 to +135 F.	1.69 "	1	303 "	Spherical.	Maximum.
Self-Registering Thermometer.	Casella, London.	9930	-25 to +120 F.	1.66 "	1	337 "	"	Minimum (spirit).
"	Casella, London.							

Besides these there are some twenty-five thermometers, by various reputable makers, self-registering and otherwise, to be used as occasion requires.
 * Loaned from the Physical Laboratory by Professor Arthur W. Wright. Arbitrary graduations.
 ** Not yet received.

The following pieces of apparatus are also in use in the thermometric work :

1. A Crouch microscope comparator. 2. A pair of microscopes provided with eye-piece micrometers, and objectives of four inch equivalent foci by Beck. 3. A small vertical cathetometer by Wm. Grunow, graduated to single millimeters, the vertical motion being 220^{mm} and the telescope having an eye-piece micrometer by Rogers. 4. A superior standard barometer, "Jas. Green, N. Y., 957," with half-inch mercury column and reading to 0.001 inches. 5. A freezing-point apparatus of two liters capacity, consisting of a tinned iron vessel within another, the space between them filled with cotton-wool. 6. A boiling-point apparatus constructed of brass after the plan of Regnault. 7. An improved boiling-point apparatus constructed entirely of glass. 8. An elaborate apparatus of brass for accurately and rapidly comparing clinical thermometers, in a suitable water bath.

Six hundred thermometers have already been carefully tested in the few months since the work was commenced, and the constantly increasing demand for this service gives promise that it will prove highly beneficial alike to the medical profession and to the science of the country.

PUBLIC LECTURES.

The fourteenth annual course of lectures to mechanics and others was given during the past year in the lecture room in North Sheffield Hall. The lecturers and the subjects are indicated in the following program :

I. Thursday, Feb. 5.—Hybridism.	Prof. Daniel C. Eaton.
II. Tuesday, " 10.—Christian Iconography; illustrated from Amiens Cathedral.	Prof. D. Cady Eaton.
III. Thursday, " 12.—Dogs.	Prof. Brewer.
IV. Tuesday, " 17.—The Heroic Element in Historical Persons and Eras.	Prof. Fisher.
V. Thursday, " 19.—The Story of a Light House.	Prof. DuBois.
VI. Tuesday, " 24.—Telling the Time.	Dr. L. Waldo.
VII. Thursday, " 26.—Adulteration of Foods.	Prof. Johnson.
VIII. Tuesday, Mar. 2.—Nutrition.	Mr. R. H. Chittenden.
IX. Thursday, " 4.—The Culture and Preparation of Tea.	Prof. S. Wells Williams.
X. Tuesday, " 9.—Fundamental Ideas in Mechanics.	Dr. Skinner.
XI. Thursday, " 11.—The Giant Cephalopods or " Devil-fish " of the North Atlantic.	Prof. Verrill.
XII. Tuesday, " 16.—Modern Sanitary Science.	Prof. Brewer.

LECTURES ON MILITARY SCIENCE.

A course of Lectures on Military Science, by officers of the U. S. Engineering School, at Willet's Point, was delivered in North Sheffield Hall as a part of the instruction in the School during the second term of the academic year 1879-80. The order and subjects of the Lectures were as follows :

I. Monday, Feb. 23.—Strategy and Grand Tactics.			Lieut. G. McC. Derby, U. S. Engineers.
II. Friday,	"	27.—Logistics.	Lieut. James L. Lusk, U. S. Engineers.
III. Monday, Mar. 1.—Small Arms and their influence on Tactics.			Lieut. W. M. Black, U. S. Engineers.
IV. Friday,	"	5.—Artillery.	Capt. J. B. Quinn, U. S. Engineers.
V. Monday,	"	8.—Fortification.	Capt. A. M. Miller, U. S. Engineers.
VI. Friday,	"	12.—Torpedoes.	General H. L. Abbot, U. S. Engineers.

ADDITIONS TO THE ZOOLOGICAL COLLECTIONS.

A. E. VERRILL, Curator; J. H. EMERTON, Assistant.

During the past year the most important of the additions to the Zoological collections have been due to the coöperation of the curator with the U. S. Fish Commission, as in previous years, in the exploration of the sea-bottom along our coasts.

The head-quarters of the Commission were at Newport, R. I., this season, and the dredging and trawling was carried on from that point over a wide area, both in the shallower waters and southward to the distant banks, from 70 to 115 miles off shore, and to a depth of 500 fathoms, with very great success.

This year the new steamer "Fish Hawk," of 480 tons, built and fitted expressly for the scientific work of the Fish Commission, was employed in these explorations. The commander, Lieut. Z. L. Tanner, U. S. N., also made another trip, after the regular work of the season was over, to the deep-water off the mouth of Chesapeake Bay, with excellent results. The very extensive and valuable series of Invertebrata, obtained during these explorations, as well as numerous collections contributed to the Fish Commission by the bank fishermen of Gloucester, Mass., have all been sent to the Museum to be elaborated and reported upon, and eventually to be distributed.

Mr. A. Agassiz has sent to the curator and Professor S. I. Smith, for elaboration, the Cephalopoda, Crustacea and Anthozoa obtained by him while exploring the bottom beneath the Gulf Stream, along the U. S. Coast, this season, on the Coast Survey steamer "Blake."

These several collections are not only very large and interesting, but they contain large numbers of genera and species wholly unknown before, as well as very many others that are new to our coast.

In these explorations, this season, the curator was assisted especially by Mr. Richard Rathbun, Mr. Sanderson Smith, and Mr. J. H. Emerton. Messrs. B. F. Koons and E. A. Andrews of this School, also joined our party, and were very useful assistants.

Professor S. I. Smith has, as usual, taken charge of the Crustacea, and has very thoroughly revised the Decapoda of northern New England. He has prepared for publication in the Proceedings of the National Museum accounts of the numerous new and strange forms of Crustacea obtained in deep-water, off our coast. He has also revised certain groups of the Amphipoda, and printed the results in the Transactions of the Connecticut Academy, Vol. IV. Mr. Oscar Harger has printed in the report of the U. S. Commissioner of Fish and Fisheries, an extended monograph of the Isopoda of New England, upon which he has for several years been engaged. Mr. E. B. Wilson has printed, in the same report, his monograph of the Pycnogonida of New England. The curator has published, in the Trans. Conn. Acad., Vol. V., the first part of a monograph of the New England Cephalopoda, including all the gigantic species hitherto discovered; the second part of this work is now printing. He has also printed more or less detailed accounts of the most interesting forms of Mollusca and Echinoderms obtained in deep-water off our coast, in the American Journal of Science, and in the Proceedings of the National Museum. These several reports are all based on specimens in the Yale Museum, and are profusely illustrated. They represent an important part of the scientific work done in the Museum during the past and previous years. Mr. J. H. Emerton, in addition to his ordinary duties, has made large numbers of excellent drawings to illustrate some of the reports referred to above, and for others now in progress.

Mr. Sanderson Smith and Mr. Richard Rathbun have been employed in the Museum during a part of the year, at the expense of the U. S. Fish Commission, to aid the curator in working up the large amount of material that has accumulated in our store-rooms.

Miss K. J. Bush has been employed in completing and copying the permanent catalogues, in writing labels for those

specimens that are on exhibition, and in other clerical duties. Her work has been done very carefully and is, in all respects, highly satisfactory. Mr. E. H. Hawley, during the first part of the year, continued the mounting of the specimens of shells and other invertebrates in the Museum. But this work has been discontinued for want of funds.

Aside from the large collections of the U. S. Fish Commission, referred to above, the following have been received :

Gardiner Morse, Jr., *Gammarus fasciatus*, Mumford, N. Y.

Robt. T. Morris, living puffing adder.

Edw. E. Brewster (S. S. S. 1878), nest and eggs of woodcock, Cornwall, Conn., collected April 24, 1879.

Mrs. M. C. Reid, New Haven, a starfish (*Asterias Forbesii*), with eight arms (a monstrosity), from Bridgeport.

Publishers of Evening Register, New Haven, an ermine, collected by Fred. Hotchkiss, in Woodbridge.

C. W. Canfield (S. S. S. 1878), eggs of *Rana sylvatica*, taken March 13, at Westerly, R. I.

Col. G. L. Febiger, rare land shells, from Louisiana.

Capt. Davis, Stony Creek, squilla and young lobster.

Mrs. E. A. Brown, barnacles from bottom of vessel.

Geo. W. Potter, E. Haven, living copper-head snake (*Ancistrodon contortrix*), and two living black snakes, East Haven.

Adrian Ohule, living puffing adder.

Wm. G. Daggett (Y. C.), living snapping turtle.

O. W. Atwater, living water-snake (*Tropidonotus sipedon*).

B. F. Koons (S. S. S.), eggs of wood turtle (*Glyptemys insculpta*), and spotted turtle (*Nanemys guttata*), New Haven.

C. M. Crouse (S. S. S.), living striped snake and two moles (*Scalops aquaticus*), from New Haven; craw-fish, Central New York.

E. V. Reynolds (S. S. S.), a miscellaneous collection, from New Haven, from Nassau, W. I., etc.

Prof. A. E. Verrill, brown snake (*Storeria Dekayi*); milk-snake (*Ophiobolus*); nest and eggs of vireo; large fiddler-crabs (*Gelasimus minax*), Annelids, etc., from New Haven.

E. A. Andrews (S. S. S.), spotted turtles (*Nanemys guttata*), New Haven.

R. C. Ballard (S. S. S.), collection of fossils.

James Snedeker, New Haven, a wood turtle (*Glyptemys insculpta*), and nest with eggs of marsh wren.

C. D. Hall, orange file-fish, from Madison.

W. F. Lane, Wallingford, little auk (*Mergulus alle*), from Guilford.

J. H. Emerton, a mole (*Scolaps aquaticus*), New Haven; nudibranch mollusca from Salem, Mass.

Horace Bowman, New Haven, cluster of oysters on a living quahog clam, orange file-fish, rudder-fish, and other fishes, New Haven.

John G. Brady (Y. C. 1874), sea-pen (*Verrillia Blakei*), from Alaska.

Samuel W. Williston, a valuable collection of named Diptera from Connecticut and California; rare birds' eggs, from Rocky Mountains.

John Pardee, living alligator from Florida.

R. S. Griswold, living alligator from Florida.

Josephus Rice, salamanders (*Desmognathus fucus*), from North Haven.

Adam Herman, New Haven, star-nosed mole, mounted, and monstrous frog, with double hind legs.

W. J. Comstock (S. S. S. 1879), toad from Hamilton Inlet, Labrador.

Prof. E. S. Dana, snakes from St. Johns River, Florida.

Prof. J. K. Thacher, larvæ of lamprey eel.

Richard Westbrook, hoary bat (*Lasiurus cinereus*), from New Haven.

National Museum, Washington, D. C., coach-whip snake and king-snake, from Florida.

Mrs. Chas. Ives, New Haven, several sponges and a rare coral (*Eusmilia*), from Nassau.

John Booth, New Haven, monstrous flask-shaped hen's egg.

Anonymous. Red-throated diver, mounted, from Alabama.

Small collections of insects have been received from S. B. Cocks, W. Van Name, Forest Shepard, F. S. Smith, Dr. H. Van Hoosear, Geo. B. Lobdell, Jr., and others.

ANNIVERSARY.

The Exercises of the Graduating Class were held in North Sheffield Hall on the evening of Tuesday, June 29, 1880. The candidates for degrees with the subjects of their graduation theses are given in the following schedule. Those marked with an asterisk were read in the evening.

CIVIL ENGINEERS. (2)

DWIGHT EDWARD PIERCE, Ph.B., *South Bethlehem, Pa.* Design for an Iron Railroad Bridge.

EBEN JENNINGS WARD, Ph.B., *Marseilles, Ill.* A Review of the Glasgow Steel Bridge.

DYNAMIC ENGINEER. (1)

AUGUSTUS JAMES EMERY, Ph.B., *Bangor, Me.* The More Important Principles which should Govern the Design and Construction of the Steam Engine.

BACHELORS OF PHILOSOPHY. (42)

DANIEL SYDNEY APPLETON (Select), *New York City.* On the United States Life-Saving Service.

CHARLES RUFUS AYRES (Select), *Woodmont.* On Agricultural Underdrainage.

CHARLES BACKUS BALL (Civil Engineering), *New Haven.* On the American Engineering Contract System.

ROGERS CLARK BALLARD (Chemistry), *Louisville, Ky.* A Method of Analysis for the Lead Furnace Slags.

HARRY BANNING BRADFORD (Dynamic Engineering), *Wilmington, Del.* On the Determination of the Mechanical Equivalent of Heat.

*HARRY OSBORN CARRINGTON (Dynamic Engineering), *New Haven.* On the Steam Injector.

JOSEPH ARTHUR CHANUTE (Chemistry), *New York City.* On Thomas and Gilchrist's Process for Dephosphorizing Iron.

GEORGE HUNTINGTON CLARK (Civil Engineering), *Norwich.* A Review of the Magnetic Iron Ore Mines of Morris County, N. J.

ARTHUR BAYLIES COFFIN (Biology), *Edgartown, Mass.* On the Circulatory System of the Dog.

EDWARD ALLEN COLBY (Chemistry), *St. Johnsbury, Vt.* On the Separation of Manganese from Calcium and Magnesium.

*FRANK MCALPINE COLLIN (Select), *Penn Yan, N. Y.* On the Tenure of Land in Ireland.

CHARLES MABIE CROUSE (Natural History), *Syracuse, N. Y.* On the Structure of *Scolopendrium vulgare*.

CHARLES THOMPSON DODD (Dynamic Engineering), *West Meriden.* On Fuel and its Combustion in relation to Steam Boilers.

ARTHUR DODGE (Dynamic Engineering), *Stamford.* On Superheated Steam.

THOMAS EDWARD DOOLITTLE (Biology), *Onarga, Ill.* On the Circulatory System of the Shad.

JACOB EDWARD EMERY (Select), *Fair Haven.* On the Acquisition and Distribution of the Public Lands of the United States.

*GEORGE EDWARD GOODSPEED (Select), *East Haddam.* On the Population of the United States.

JOHN WARREN HARDENBERGH (Civil Engineering), *Jersey City, N. J.* A Review of the Metropolitan Elevated Railroad.

LOUIS MAYNARD HIGGINSON (Select), *Newburgh, N. Y.* On the Contributions of Professor Cairnes to Political Economy.

*WALTER HITCHCOCK (Biology), *Cheshire.* On the Nervous System of *Diemictylus viridescens*.

- THEODORE LANAHAN HOOPER (Dynamic Engineering), *Baltimore, Md.* A Discussion of Slide Valves by means of Zeuner's Valve Diagrams.
- COLIN MACRAE INGERSOLL (Dynamic Engineering), *New Haven.* On the Trowbridge-Mather Automatic Boiler.
- MARTIN EDWARD JENSEN (Chemistry), *Cleveland, O.* Analysis of Cymatolite.
- *DAVID BROWN LEWIS (Civil Engineering), *Utica, N. Y.* On the Belgian System of Cable-Towing as used on the Erie Canal.
- ERNEST THEOPHILUS LIEFELD (Select), *New Haven.* On the Treatment of Criminals.
- *WILLEY SOLON MCCREA (Select), *Chicago, Ill.* On the Problem of Transportation.
- JOHN MOORHEAD (Chemistry), *Pittsburg, Pa.* On the Best Volumetric Methods of Determining Iron.
- *CARL EUGENE MUNGER (Biology), *Watertown.* On the Digestive System of *Bascanion constrictor*.
- EDWARD BUTLER NEEDHAM (Biology), *Hartford.* On the Respiration of the Frog (*Rana fontinalis*).
- GEORGE BENJAMIN PHELPS (Biology), *Watertown, N. Y.* On the Rate of Elimination of Arsenic by the Kidneys.
- *DWIGHT PORTER (Civil Engineering), *Hartford.* On Storage Reservoir, No. 2, at Farmington, Conn.
- EDWARD FREEMAN PORTER (Select), *Stowe, Vt.* On the Effect of Machinery on Wages.
- EDWARD VILETTE REYNOLDS (Natural History), *Chicago, Ill.* On the Appendages of the Hermit Crab (*Eupagurus pollicaris*).
- *EDWIN MCNEIL ROGERS (Dynamic Engineering), *Central City, Col.* Design for a Gravity Road.
- GEORGE BLISS ROGERS (Select), *Lexington, Mass.* On Rent.
- EDWARD RUPERT SARGENT (Select), *New Haven.* On the Panic of 1873.
- WILLIAM BARTLETT SCHOFIELD (Dynamic Engineering), *West Point, N. Y.* On the History of the Locomotive Steam Engine.
- HENRY STARKWEATHER (Dynamic Engineering), *New Haven.* On the Value of the Condenser in the Economy of Fuel.
- ADRIAN ROWE WADSWORTH (Civil Engineering), *Farmington.* On the Hartford Sewage System.
- WILLIAM CANDEE WARREN (Select), *Buffalo, N. Y.* On the Signal Service of the United States.
- ADOLPH FREDERIC WEHNER (Dynamic Engineering), *New Haven.* On the Magneto-Electric Machine.
- GEORGE GOODWIN WILLIAMS (Select), *Glastonbury.* On the Suppression of the Theater during the Reign of Charles I.

PRIZES.

The following prizes were awarded during the year :

CLASS OF 1880.

For excellence in German, the prize awarded to FRANK McALPINE COLLIN, with honorable mention of GEORGE HUNTINGTON CLARK and ERNEST THEOPHILUS LIEFELD.

For excellence in French, the prize awarded to DWIGHT PORTER.

For excellence in Civil Engineering, the prize awarded to DWIGHT PORTER.

CLASS OF 1881.

For excellence in the Mathematics of Junior Year, the prize awarded to WILLIAM MEEKER WOOD, with honorable mention of GEORGE FREDERICK BOSWORTH, JEME TIEN YOW, and WILLIS BENTON WRIGHT.

CLASS OF 1882.

For excellence in all the Studies of Freshman Year, the prize divided between HARRY WEIR CASEY and FRANK JUDSON LAMBERT.

For excellence in German, the prize divided between FREDERICK WILLIAM LaFORGE and NORMAN SMITH LATHAM, with honorable mention of KEE YUNG CHUN.

For excellence in Mathematics, the prize divided between HARRY WEIR CASEY and FRANK JUDSON LAMBERT.

For excellence in Physics, the prize awarded to HARRY WEIR CASEY.

For excellence in Chemistry, the prize awarded to FRANK JUDSON LAMBERT.

For excellence in Descriptive Geometry, the prize divided between HARRY WEIR CASEY and FRANK JUDSON LAMBERT.

For excellence in English Composition, first prizes awarded to HENRY JONATHAN BIDDLE, HARRY WEIR CASEY, JAMES JOHN DRUMMOND, ROBERT OGDEN DUBOIS, FREDERICK WILLIAM LaFORGE, and SHELDON ELTON MINOR; second prizes to NATHAN GROSS BOZEMAN, ALEXANDER BRYAN JOHNSON, NORMAN SMITH LATHAM, and LEWIS VALENTINE PIRSSON.

CLASS OF 1883.

For the best Entrance Examination, the prize awarded to JOHN ALPHEUS ALLEN, New Haven. Prepared at the Hillhouse High School, New Haven.

PROGRAMME OF STUDIES,

AND

CATALOGUE,

FOR THE COLLEGE YEAR 1880-81.

CALENDAR.

1880.		
16 Sept.	Thursday,	First Term begins.
23 Dec.	Thursday,	First Term ends.
1881.		
Winter Vacation of three weeks.		
13 Jan.	Thursday,	Second Term begins.
13 April,	Wednesday,	Spring Recess begins.
20 April,	Wednesday,	Spring Recess ends.
28 June,	Tuesday,	Meeting of Appointing Board
28 June,	Tuesday,	Anniversary.
29 June,	Wednesday,	Commencement.
30 June,	Thursday,	Examination for Admission.
1, 2 July,	Friday, Sat., }	
Summer Vacation of eleven weeks.		
13, 14 Sept.	Tues., Wedn.,	Examination for Admission.
15 Sept.	Thursday,	First Term begins.
22 Dec.	Thursday,	First Term ends.

ABBREVIATIONS.

S. H.	-	-	-	-	-	Sheffield Hall.
N. S. H.	-	-	-	-	-	North Sheffield Hall.
TR.	-	-	-	-	-	Treasury Building.
D.	-	-	-	-	-	Durfee College.
F.	-	-	-	-	-	Farnam College.
E.	-	-	-	-	-	East Divinity Hall.
W.	-	-	-	-	-	West Divinity Hall.
P. M.	-	-	-	-	-	Peabody Museum.
A.	-	-	-	-	-	Absent on leave.

In the buildings belonging to the Sheffield Scientific School, the rooms numbered from 1 to 21 are in Sheffield Hall; from 26 to 58 in North Sheffield Hall.

CORPORATION.

PRESIDENT.

REV. NOAH PORTER, D.D., LL.D.

FELLOWS.

HIS EXCELLENCY CHARLES B. ANDREWS, LL.D., LITCHFIELD.

HIS HONOR DAVID GALLUP, PLAINFIELD.

REV. LEONARD BACON, D.D., LL.D., NEW HAVEN.

REV. THEODORE D. WOOLSEY, D.D., LL.D., NEW HAVEN.

REV. HIRAM P. ARMS, D.D., NORWICH TOWN.

REV. GEORGE J. TILLOTSON, M.A., WETHERSFIELD.

HON. ALPHONSO TAFT, LL.D., CINCINNATI, O.

REV. AMOS S. CHESEBROUGH, M.A., DURHAM.

REV. MYRON N. MORRIS, M.A., WEST HARTFORD.

HON. WILLIAM M. EVARTS, LL.D., NEW YORK CITY.

HON. WILLIAM B. WASHBURN, LL.D., GREENFIELD, MASS.

REV. SAMUEL G. WILLARD, M.A., COLCHESTER.

HON. HENRY B. HARRISON, M.A., NEW HAVEN.

REV. JOSEPH W. BACKUS, M.A. ROCKVILLE.

REV. CHARLES RAY PALMER, M.A., BRIDGEPORT.

REV. JOSEPH H. TWICHELL, B.A., HARTFORD.

HON. WILLIAM WALTER PHELPS, M.A., NEW YORK CITY.

MASON YOUNG, M.A., NEW YORK CITY.

SECRETARY.

FRANKLIN B. DEXTER, M.A.

TREASURER.

HENRY C. KINGSLEY, M.A.

(5 TR.) 23 Hillhouse av.

GOVERNING BOARD.

APPOINTED BY THE CORPORATION OF YALE COLLEGE.

President.

REV. NOAH PORTER, D.D., LL.D., (7 TR.) 31 Hillhouse av.

Chairman and Executive Officer.

GEORGE J. BRUSH, (3 S. H.) 14 Trumbull st.

Professors.

ARRANGED IN THE ORDER OF THEIR GRADUATION.

WILLIAM A. NORTON,
Civil Engineering. (34 N. S. H.) 72 Prospect st.

CHESTER S. LYMAN,
Physics and Astronomy, Theoretical and Practical. (39 N. S. H.) 88 Trumbull st.

WILLIAM D. WHITNEY,
Linguistics and French. (205 D.) 246 Church st.

GEORGE J. BRUSH,
Mineralogy. (3 S. H.) 14 Trumbull st.

SAMUEL W. JOHNSON,
Theoretical and Agricultural Chemistry. (12 S. H.) 54 Trumbull st.

WILLIAM H. BREWER,
Agriculture (NORTON Professor). (4 S. H.) 246 Orange st.

JOHN E. CLARK,
Mathematics. 29 Eld st.

DANIEL C. EATON,
Botany. (41 N. S. H.) 70 Sachem st.

THOMAS R. LOUNSBURY,
English. 22 Lincoln st.

FRANCIS A. WALKER,
Political Economy and History. 68 Whitney av.

OSCAR D. ALLEN,
Analytical Chemistry and Metallurgy. (13 S. H.) 189 Temple st.

ADDISON E. VERRILL,
Zoölogy and Geology. (15 P. M.) 148 College st.

SIDNEY I. SMITH,
Comparative Anatomy. (14 P. M.) 148 College st.

WILLIAM G. MIXTER,
Chemistry. (8 S. H.) 8 Trumbull st.

A. JAY DUBOIS,
Dynamical Engineering (HIGGIN Professor). (45 N. S. H.) 328 Howard av.

LECTURERS, INSTRUCTORS AND ASSISTANTS

ADDITIONAL TO THE GOVERNING BOARD.



ALBERT S. WHEELER, <i>German.</i>	27 Eld st.
MARK BAILEY, <i>Elocution.</i>	(105 F.) 200 Temple st.
JOHN H. NIEMEYER, Professor in Yale School of Fine Arts, <i>Free Hand Drawing.</i>	8 Art School.
FREDERICK R. HONEY, <i>Descriptive Geometry and Projection Drawing.</i>	(53 N. S. H.) 14 Lincoln st.
JOSEPH J. SKINNER, <i>Mathematics and French.</i>	176 York st.
JOSEPH F. KLEIN, <i>Kinematics and Machine Design.</i>	(45 N. S. H.) 14 Whalley av.
GEORGE W. HAWES, <i>Mineralogy and Lithology.</i>	(2 P. M.) 116 High st.
JAMES F. COLBY, <i>Political Economy.</i>	Room 10, 179 Church st.
ALLEN B. HOWE, <i>Analytical Chemistry.</i>	138 College st.
RUSSELL H. CHITTENDEN, <i>Physiological Chemistry.</i>	(13 S. H.) 95 Humphrey st.
WILLIAM J. COMSTOCK, <i>Analytical Chemistry.</i>	167 Crown st.

GRADUATE STUDENTS.

Otis Elihu Atwater, B.A.	<i>Brattleboro, Vt.</i>	34 S. M.
Rogers Clark Ballard, PH.B.	<i>Louisville, Ky.</i>	92 W.
John Pomeroy Bartlett, PH.B.	<i>New Britain,</i>	16 S. H.
Harry Lane Bruner, B.A. } Abingdon College.	<i>Abingdon, Ill.</i>	169 Temple st.
Charles Sumner Burt, } U. S. Military Academy, } West Point.	<i>Marquette, Mich.</i>	114 College st.
Henry Osborn Carrington, PH.B.	<i>New Haven,</i>	527 Chapel st.
William James Comstock, PH.B.	<i>Toledo, O.</i>	167 Crown st.
John Edward Cromwell, PH.B.	<i>Cranford, N. Y.</i>	6½ York sq.
Henry Allen Hazen, M.A. } Dartmouth College.	<i>New Haven,</i>	298 Chapel st.
William Hale Herrick, M.A. } Williams College.	<i>Grinnell, Iowa,</i>	90 Whalley av.
Alfred Edwards Hooker, B.A.	<i>New Haven,</i>	62 Prospect st.
William Forest Hutchison, B.A.	<i>Norwich,</i>	464 Chapel st.
Colin Macrae Ingersoll, PH.B.	<i>New Haven,</i>	85 Trumbull st.
Joseph Frederick Klein, D.E.	<i>New Haven,</i>	14 Whalley av.
Benjamin Franklin Koons, B.A. } Oberlin College.	<i>Sulphur Springs, O.</i>	36 Court st.
Samuel Waldron Lambert, B.A.	<i>New York City,</i>	90 High st.
Calvin McCormick, B.A. } Franklin College, Ind.	<i>Franklin, Ind.</i>	215 York st.
Dwight Porter, PH.B.	<i>Hartford,</i>	14 S. H.
Frederick Sumner Smith, B.A.	<i>New Haven,</i>	78 Trumbull st.
Heman Bangs Smith, M.D.	<i>Westville,</i>	Westville.

SENIOR CLASS.

Charles Francis Adams,	<i>Jessups, Md.</i>	36 Elm st.
Ethan Allen Andrews,	<i>Tarrytown, N. Y.</i>	175 Temple st.
Edward Bailey, Jr.,	<i>Harrisburg, Pa.</i>	489 Chapel st.
Frank Lewis Bigelow,	<i>New Haven,</i>	278 Orange st.
George Frederick Bosworth,	<i>Milford.</i>	94 Olive st.
Lester Paige Breckenridge,	<i>Westfield, Mass.</i>	6½ York sq.
Charles Sheldon Burnham,	<i>Woodbridge,</i>	Watson st.
Charles Monroe Carpenter, Jr.,	<i>Brooklyn, N. Y.</i>	134 College st.
Howard Field Chappell,	<i>Chicago, Ill.</i>	36 Elm st.
George Strong Daniels,	<i>New York City,</i>	73 w.
Charles Manville Downs,	<i>New Haven,</i>	70 Wooster st.
John Slade Ely,	<i>New York City,</i>	71 w.
George Sherman Folsom,	<i>Northford,</i>	161 George st.
Seymour Francis Frasick,	<i>Hartford,</i>	99 Wall st.
Albert Moses Gerstle,	<i>Youngstown, O.</i>	6 Orange st.
Henry Holbrook Gladding,	<i>New Haven,</i>	170 Martin st.
William Loomis Griswold,	<i>Banksville,</i>	173 Whalley av.
Frederic Jonathan Hiller,	<i>Cohoes, N. Y.</i>	71 w.
Samuel Higgins,	<i>Buffalo, N. Y.</i>	85 w.
Blain Jamison,	<i>New Orleans, La.</i>	489 Chapel st.
Jeme Tien Yow,	<i>Canton, China,</i>	44 Elm st.
Edmund Parker Lord,	<i>Saxonville, Mass.</i>	86 w.
Richard Becker Lyon,	<i>New Haven,</i>	710 Chapel st.
Silas Metzger,	<i>New Haven,</i>	17 Grove st.
Edwin Kirtland Morse,	<i>Poland, O.</i>	49 Crown st.
Marcus Dady Munn,	<i>Southington,</i>	173 Whalley av.
Marvin Olcott,	<i>Corning, N. Y.</i>	86 w.
Owyang Keng,	<i>Canton, China,</i>	169 Temple st.
Francis Stuyvesant Peabody,	<i>Chicago, Ill.</i>	36 Elm st.
Oliver Phelps,	<i>Canandaigua, N. Y.</i>	92 w.
Addison Alexander Righter,	<i>Newark, N. J.</i>	73 w.
George Lewis Sargent,	<i>New Haven,</i>	51 Elm st.
Louis Jacob Schiller,	<i>New Haven,</i>	8 Martin st.
Bernard Joseph Shanley,	<i>New Haven,</i>	211 Franklin st.
Frank Augustus Smith,	<i>New Haven,</i>	36 Lyon st.
Henry Taber,	<i>New York City,</i>	A.
John Heyward Trumbull,	<i>Talcahuano, Chili,</i>	41 Trumbull st.
Richard Lindsay Trumbull,	<i>Talcahuano, Chili,</i>	41 Trumbull st.
Howard VanRensselaer,	<i>Albany, N. Y.</i>	23 Prospect st.
Frank Charles Warner,	<i>West Suffield,</i>	116 College st.
Robert William Watson,	<i>Ashtabula, O.</i>	489 Chapel st.
William Meeker Wood,	<i>Morristown, N. J.</i>	489 Chapel st.
Arthur Burnham Woodford,	<i>West Winsted,</i>	116 College st.
Clark Wright,	<i>West Roxbury, Mass.</i>	82 Wall st.
Willis Benton Wright,	<i>Cromwell,</i>	88 Grove st.

JUNIOR CLASS.

Horace Ellsworth Andrews,	<i>Cleveland, O.</i>	43 College st.
George Jackson Angell,	<i>Brooklyn, N. Y.</i>	43 College st.
Alfred Warren Armstrong,	<i>Cleveland, O.</i>	43 College st.
Charles Noyes Batcheller,	<i>Wallingford, Vt.</i>	6½ York sq.
Henry Jonathan Biddle,	<i>Philadelphia, Pa.</i>	36 Elm st.
Francis Hayes Blake,	<i>New Haven,</i>	Mill Rock.
Nathan Gross Bozeman,	<i>New York City,</i>	196 Crown st.
Frederick Casper,	<i>West Meriden,</i>	529 Chapel st.
Charles Chamberlain,	<i>Brooklyn, N. Y.</i>	489 Chapel st.
William Anson Chamberlin.	<i>New Haven,</i>	30 Trumbull st.
Kü Yung Chun,	<i>Canton, China,</i>	44 Elm st.
William Henry Crocker,	<i>San Francisco, Cal.</i>	36 Elm st.
Walter Root Downs,	<i>New Haven,</i>	64 LaFayette st.
James John Drummond,	<i>Winfield, Ill.</i>	6½ York sq.
Robert Ogden DuBois,	<i>New Haven,</i>	328 Howard av.
George Mortimer Dunham,	<i>Unionville,</i>	109 Elm st.
Richard Lawrence Everit,	<i>New Haven,</i>	281 Whitney av.
Herbert Waldron Faulkner,	<i>Stamford,</i>	233 York st.
William Alanson Hall,	<i>Morris,</i>	95 Wooster st.
Alexander Bryan Johnson,	<i>Utica, N. Y.</i>	83 w.
Herbert Deatherage Lacey,	<i>Brooklyn, N. Y.</i>	36 Elm st.
Frederick William La Forge,	<i>Waterbury,</i>	6½ York sq.
Frank Judson Lambert,	<i>New Haven,</i>	12 Eld st.
Norman Smith Latham,	<i>North Manchester,</i>	120 Dwight st.
Cassius Samuel Lyman,	<i>Holyoke, Mass.</i>	25 Prospect st.
Nathaniel White Lynde,	<i>West Brookfield, Mass.</i>	6½ York sq.
William Danforth MacQuesten,	<i>Washington, D. C.</i>	167 Temple st.
Sheldon Elton Minor,	<i>Thomaston,</i>	167 Temple st.
Nagamoto Okabe,	<i>Tokio, Japan,</i>	92 Grove st.
Edward E. Paramore,	<i>St. Louis, Mo.</i>	36 Elm st.
Lewis Valentine Pirsson,	<i>New York City,</i>	121 Park st.
Harry Smith Pope,	<i>Jersey City, N. J.</i>	61 w.
James Edward Pope, Jr.,	<i>Jersey City, N. J.</i>	61 w.
John Hutchinson Robinson,	<i>Lake Village, Ark.</i>	215 York st.
Robert Browning Rood,	<i>Great Barrington, Mass.</i>	167 Temple st.
Charles Edward Stockder, Jr.,	<i>West Meriden,</i>	6½ York sq.
Fred Moore Strong,	<i>Chicago, Ill.</i>	36 Elm st.
Arthur Graham Thompson,	<i>Milford,</i>	43 College st.
Edwin Thorne,	<i>New York City,</i>	65 Whitney av.
Thomas Pearsall Thorne,	<i>Millbrook, N. Y.</i>	65 Whitney av.
Walter Joy Vought,	<i>Buffalo, N. Y.</i>	85 w.
Edward Loder Whittemore,	<i>Rye, N. Y.</i>	76 w.
Alfred Buckingham Wilcox,	<i>Chicago, Ill.</i>	76 w.
Chauncey Pratt Williams, Jr.,	<i>Albany, N. Y.</i>	36 Elm st.
S. Lawrence Williams,	<i>Chicago, Ill.</i>	36 Elm st.
Chan Lok Wing,	<i>China,</i>	44 Elm st.

FRESHMAN CLASS.

Paul Whittin Abbott,	<i>New Haven,</i>	257 Church st.
Gustavo Alfonso,	<i>New York City,</i>	88 Wall st.
John Alpheus Allen,	<i>New Haven,</i>	189 Temple st.
Theodore Davenport Bacon,	<i>Norwich,</i>	247 Church st.
Benjamin Safford Barrows,	<i>Hartford.</i>	128 High st.
George Andrew Barrows,	<i>Philadelphia, Pa.</i>	114 College st.
Henry Dudley Barry,	<i>Constantine, Mich.</i>	29 Prospect st.
John Bartholomew,	<i>Guilford,</i>	15 Wooster pl.
Frederic Robinson Bartlett,	<i>Freeport, Ill.</i>	192 York st.
Frederick Elijah Beach,	<i>New Haven,</i>	33 Lyon st.
Henry Whitney Berryman,	<i>New York City,</i>	117 York st.
William Williams Bond,	<i>New London,</i>	33 Prospect st.
Isaac Judson Boothe,	<i>Birmingham,</i>	84 Wall st.
Charles Allan Bowles,	<i>Springfield, Mass.</i>	94 Grove st.
Frederick Truman Bradley,	<i>New Haven,</i>	142 Orange st.
Charles Parker Breese,	<i>Meriden.</i>	529 Chapel st.
Charles Sumner Brown,	<i>East Hampton,</i>	12 Trumbull st.
Charles Milo Carpenter,	<i>Madison, Wisc.</i>	167 Temple st.
Horace Raymond Carpenter,	<i>Aston, N. Y.</i>	162 York st.
Fred Willis Chapman,	<i>Chico, Cal.</i>	82 Wall st.
Samuel Myron Chase,	<i>Chicago, Ill.</i>	184 York st.
Harry Nelson Covell,	<i>Stamford,</i>	200 York st.
Wayne Darlington,	<i>West Chester, Pa.</i>	120 High st.
Edward Bradford Dench,	<i>Bridgeport,</i>	18 E.
Henry Kelsey Devereux,	<i>Cleveland, O.</i>	55 Trumbull st.
Edward Peers Eastwick, Jr.	<i>New York City,</i>	192 York st.
Frank Hynard Edsall,	<i>Hamburgh,</i>	128 High st.
Horatio Southworth Frazer,	<i>Holyoke, Mass.</i>	134 College st.
Harry Brainard Gaylord,	<i>New Haven,</i>	40 Academy st.
Charles Lockwood Gold,	<i>West Cornwall,</i>	49 Grove st.
Charles Stewart Hall,	<i>Warren, O.</i>	49 Grove st.
George Vance Harper,	<i>Sing Sing, N. Y.</i>	82 Wall st.
William Harper,	<i>Shippensburg, Pa.</i>	82 Wall st.
William Howard Hart,	<i>New Haven,</i>	82 Trumbull st.
Allen Hubbard,	<i>Westfield, Mass.</i>	6½ York sq.
Arthur Henry Jackson,	<i>New Haven,</i>	12 Warren st.
Henry Clay Johnson,	<i>Rome, Ga.</i>	153 Crown st.
Wylie Brantley Jones,	<i>New Haven,</i>	89 Wooster st.
Tsu Ye Ki,	<i>Shanghai, China,</i>	144 High st.
William Klein,	<i>New Haven,</i>	86 Nicoll st.
John Elmer Lockwood,	<i>Stamford,</i>	146 Dixwell av.
William Ellison Lockwood,	<i>Stamford,</i>	146 Dixwell av.
James Lyman,	<i>Middlefield,</i>	107 W.
John Lyman,	<i>Middlefield,</i>	107 W.
George Smith Hunt McDowell,	<i>Portland, Me.</i>	33 Prospect st.

John Henry Mann,	<i>Utica, N. Y.</i>	116 w.
Donald Grant Mitchell, Jr.	<i>Edgewood,</i>	84 Wall st.
Oliver Rockwell Morgan,	<i>Glastonbury,</i>	187 Temple st.
John Edmund Newell,	<i>Chicago, Ill.</i>	464 Chapel st.
Henry Curtis Nutt,	<i>Chicago, Ill.</i>	489 Chapel st.
Frank Spooner Parrott,	<i>Bridgeport,</i>	36 Elm st.
George Shipman Payson,	<i>Chicago, Ill.</i>	464 Chapel st.
Edward Wells Penfield,	<i>Chicago, Ill.</i>	94 Grove st.
David Murdoch Pratt,	<i>Elmira, N. Y.</i>	198 Crown st.
Willie Sherman Randall,	<i>Birmingham,</i>	72 High st.
Robert Ranlet,	<i>Holyoke, Mass.</i>	134 College st.
Albert William Robert,	<i>New York City,</i>	237 Orange st.
Joseph Warren Rogers, Jr.	<i>Scarborough, N. Y.</i>	82 Wall st.
Alfred Hughes Rowe,	<i>Fair Haven,</i>	Fair Haven.
Frederick Baylies Samson,	<i>Richmond, Ind.</i>	165 Temple st.
Charles Lansing Sayre,	<i>Utica, N. Y.</i>	116 w.
Horace Lee Simpson,	<i>Pensacola, Fla.</i>	198 Crown st.
Ebenezer Hubbard Skinner,	<i>Escambia, Fla.</i>	198 Crown st.
Joseph Allen Skinner,	<i>Holyoke, Mass.</i>	146 College st.
Edward Irving Stone,	<i>Bethlehem,</i>	365 Orchard st.
John Edwards Stryker,	<i>Catskill, N. Y.</i>	29 Prospect st.
Elmer Ellsworth Thompson,	<i>St. Louis, Mo.</i>	55 Trumbull st.
Charles Ridgway VanBlarcom,	<i>Cornwall, N. Y.</i>	88 Wall st.
Alonzo Felton Wood, Jr.	<i>West Haven,</i>	77 George st.
Alexander Wurts,	<i>New Haven,</i>	65 Whitney av.
Robert Hawthorne Wylie,	<i>Chester, S. C.</i>	258 Orange st.

FRESHMEN, 71.

SPECIAL STUDENTS NOT CANDIDATES FOR A DEGREE.

Louis Asta Buruaga,	<i>Santiago, Chili,</i>	258 Orange st.
John Lindley Coates,	<i>Kansas City, Mo.</i>	66 w.
Glover Edward Sanford,	<i>Bridgeport,</i>	494 Chapel st.
Joseph Singler,	<i>Ansonia,</i>	Ansonia.
Hiram Colin Slavens,	<i>Kansas City, Mo.</i>	66 w.
Warren A. Spalding,	<i>New Haven,</i>	89 Church st.
William Bradbury Spring,	<i>Portland, Me.</i>	36 Elm st.
William Fletcher Stone,	<i>New Haven,</i>	143 Lamberton st.
William Petit Trowbridge, Jr.	<i>New Haven,</i>	82 Prospect st.

SPECIAL STUDENTS, 9.

SUMMARY.

GRADUATES,	-	-	-	-	-	20
SENIORS,	-	-	-	-	-	45
JUNIORS,	-	-	-	-	-	46
FRESHMEN,	-	-	-	-	-	71
SPECIAL,	-	-	-	-	-	9
						<hr/>
TOTAL,	-	-	-	-	-	191

SHEFFIELD SCIENTIFIC SCHOOL.

I.

OBJECTS.

THE SHEFFIELD SCIENTIFIC SCHOOL is devoted to instruction and researches in the mathematical, physical, and natural sciences, with reference to the promotion and diffusion of science, and also to the preparation of young men for such pursuits as require especial proficiency in these departments of learning. It is one of the Departments of Yale College, like the law, medical, theological, and art schools, having its separate funds, buildings, teachers, and regulations, but governed by the Corporation of Yale College, which appoints the professors and confers the degrees. It is, in part, analogous to the academic department, or classical college, and, in part, to the professional schools.

The instruction is intended for two classes of students:—

I. Graduates of this or of other Colleges, and other persons qualified for advanced or special scientific study.

II. Undergraduates who desire a training chiefly mathematical and scientific, in less part linguistic and literary, for higher scientific studies, or for various other occupations to which such training is suited.

II.

HISTORY AND ORGANIZATION.

The School was commenced in 1847. In 1860, a convenient building and a considerable endowment were given by Joseph E. Sheffield, Esq., of New Haven, whose name at the repeated request of the Corporation of Yale College, was afterward attached to the foundation. Mr. Sheffield has since frequently and munificently increased his original gifts.

In 1863, by an act of the Connecticut Legislature, the national grant for the promotion of scientific education (under the congressional enactment of July, 1862) was given to this department of Yale College. Since that time, and especially since the autumn of 1869, numerous liberal gifts have been received from the citi-

zens of New Haven, and from other gentlemen in Connecticut, New York, and St. Louis, for the endowment of the School, and the increase of its collections.

The action of the State led to the designation by law of a State Board of Visitors, consisting of the Governor, Lieutenant-Governor, three senior Senators, and the Secretary of the State Board of Education; and this Board, with the Secretary of the Scientific School, is also the Board for the appointment of students to hold the State scholarships.

At the request of the Governing Board, the Corporation of Yale College has also appointed a Board of Councillors for the School, consisting of a number of gentlemen who have taken a deep interest in its welfare.

The Governing Board consists of the President of Yale College and the Professors who are permanently attached to the School. There are several other instructors associated with them, a part of whom are connected with other departments of the College.

III.

BUILDINGS AND APPARATUS.

The two buildings in which the work of instruction in the Scientific School is mainly carried on are called Sheffield Hall and North Sheffield Hall; but instruction in Mineralogy, Geology, and Biology, including Zoölogy and Comparative Anatomy, is now given entirely in the Peabody Museum. These halls contain a large number of recitation and lecture rooms, a hall for public assemblies and lectures, chemical and metallurgical laboratories, a photographical room, an astronomical observatory, museums, a library and reading room, besides studies for some of the professors, where their private technical libraries are kept.

The following is a summary statement of the collections belonging to the School:

1. Laboratories and Apparatus in Chemistry, Metallurgy, Physics, Photography, and Zoölogy.
2. Metallurgical Museum of Ores, Furnace Products, etc.
3. Agricultural Museum of Soils, Fertilizers, useful and injurious insects, etc.
4. Collections in Zoölogy.
5. Astronomical Observatory, with an equatorial telescope by Clark and Sons of Cambridge, a meridian circle, etc.
6. A Collection of Mechanical Apparatus, constituting the "Collier Cabinet."

7. Models in Architecture, Geometrical Drawing, Civil Engineering, Topographical Engineering, and Mechanics; diagrams adapted to public lectures; instruments for field practice.

8. Maps and Charts, topographical, hydrographical, geological, etc.

The herbarium of Professor Brewer, and the astronomical instruments of Professor Lyman, are deposited in the buildings. Professor Eaton's herbarium, near at hand, is freely accessible. Students also have access to the various laboratories and collections in Natural Science in the Peabody Museum.

Students are also admitted, under varying conditions, to the College and Society libraries, the College Reading Room, the School of the Fine Arts, and the Gymnasium.

IV.

THE LIBRARY.

The special technical library of the Scientific School consists of about five thousand volumes. Included in this is the "Hillhouse Mathematical Library" of twenty-four hundred volumes, collected during a long series of years by Dr. William Hillhouse, and in 1870 purchased and presented to the Institution by Mr. Sheffield. A catalogue of this collection forms a supplement to the Annual Report of the Governing Board for 1870. All the prominent scientific journals of this country and of Europe, together with the proceedings of foreign academies, and of scientific societies, can be found either in this library or in the College Library to which students have access.

V.

INSTRUCTION FOR GRADUATE AND SPECIAL STUDENTS.

Persons who have gone through undergraduate courses of study, here or elsewhere, may avail themselves of the facilities of the School for more special professional training in the physical sciences and their applications, gaining in one, two, or three years the degree of BACHELOR OF PHILOSOPHY, or, in two additional years of Engineering study, that of CIVIL ENGINEER, or of DYNAMIC ENGINEER.

Or, engaging in studies of a less exclusively technical character, they may become candidates for the degree of DOCTOR OF PHILOSOPHY. The instruction in such cases will be adapted to the particular needs and capacities of each student, and may be combined with that given by the graduate instructors in other departments of the University. This degree is conferred upon those who, hav-

ing already taken a Bachelor's degree, engage as students in the Department of Philosophy and the Arts for not less than two years in assiduous and successful study. It is not given upon examination to those whose studies are pursued elsewhere. The requirements for it will in some cases exact of the student more than two years of post-graduate labor; so, especially, wherever the course of undergraduate study has been, as in the Scientific School, of less than four years. The candidate must pass a satisfactory final examination, and present a thesis giving evidence of high attainment in the branches of knowledge to which he has attended. A good knowledge of Latin, German and French will be required in all cases, unless, for some exceptional reason, the candidate be excused by the Faculty. The graduating fee is ten dollars.

Subjects likely to receive special attention are suggested as follows:

Professor NORTON will instruct in applied mechanics and in spherical astronomy.

Professor LYMAN, in the use of meridional and other astronomical instruments, and in astronomical spectroscopy.

Professor DuBOIS, in the principles of thermodynamics, and utilization of heat as a source of power.

Professor BRUSH, in the analysis and determination of mineral species, and in descriptive mineralogy.

Professor JOHNSON, in theoretical, analytical, and agricultural chemistry.

Professor BREWER, in agriculture and forest culture, in the use of the microscope, and in physical geography.

Professor CLARK, in definite integrals, differential equations, analytical mechanics, the theory of numerical approximations, and the method of least squares.

Professor EATON, in structural and systematic botany, including the North American flora and the description of genera and species.

Professor WALKER, in public finance and in the statistics of industry.

Professor ALLEN, in analytical chemistry, and in metallurgy.

Professor VERRILL, and Professor SMITH, in zoology and geology.

The same courses of study are open, for a longer or shorter time, to graduate students who do not desire to become candidates for a degree.

Students who have taken the degree of Bachelor of Philosophy, may obtain the degree of CIVIL or of DYNAMIC ENGINEER at the end of two academical years, by pursuing the following higher course of study and professional training.

The course of study for the degree of CIVIL ENGINEER will comprise—

1. Higher Calculus. Higher Geometry. Theory of Numerical Operations.
2. Analytical Mechanics. Mechanics applied to Engineering.
3. A Course of Construction and Design. Projects.
4. Practical Astronomy, with use of instruments, computations, etc.

This course will occupy one year.

To secure the requisite amount of professional knowledge and practice, the candidate will be required to furnish a comprehensive report of the results of an examination into the existing condition of some special line of constructive art; or to present proper evidence that he has had actual charge in the field, for several months, of construction or surveying parties, or held some responsible position deemed equivalent to this.

An elaborate design must also be submitted of some projected work of construction, based upon exact data obtained from careful surveys made by the candidate, and comprising all the requisite calculations, and the necessary detailed drawings, and accompanied by full specifications of the work to be done, and the requirements to be met by the contractor.

The fee for this degree is five dollars.

The course of study for the degree of DYNAMIC ENGINEER will comprise—

1. Higher Calculus. Higher Geometry. Theory of Numerical Operations.
2. General Principles of Dynamics (Analytical Mechanics), including special application of these principles to Dynamical problems.
3. Construction of Machines. Designs.
4. Preparation of theses on special subjects in Dynamic Engineering.

During the second year candidates will be permitted to employ such a portion of their time as may be deemed advisable or necessary in the examination of engineering works and manufacturing establishments, and may also have the privilege of entering upon professional practice, provided it is done with the knowledge and consent of the Professor of Dynamic Engineering, and under such circumstances as shall appear to him to be favorable to professional progress.

An elaborate thesis on some professional subject, with an original design, or project, accompanied by proper working drawings, will be required at the end of the second year.

The fee for this degree is five dollars.

SPECIAL STUDENTS.—For the benefit of those who, being fully qualified, desire to pursue particular studies without reference to the obtaining of a degree, special or irregular students are received in most of the departments of the School; not, however, in the Select Course or in the Freshman Class.

It should be distinctly understood that these opportunities are not offered to persons who are incompetent to go on with regular courses, but are designed to aid those who, having received a sufficient preliminary education elsewhere, desire to increase their proficiency in special branches.

VI.

REQUIREMENTS FOR ADMISSION AND COURSES OF INSTRUCTION FOR UNDERGRADUATE STUDENTS.

TERMS OF ADMISSION.—Candidates must be not less than fifteen years of age, and must bring satisfactory testimonials of moral character from their former instructors or other responsible persons.

For admission to the Freshman Class the student must pass a thorough examination in the following subjects:

English—including grammar, spelling and composition. In grammar, Whitney's *Essentials of English Grammar*, or an equivalent.

History of the United States.

Geography.

Latin—six books of Cæsar's Commentaries, or their equivalent, and simple exercises in prose composition.

Arithmetic—including the metric system of weights and measures.

Algebra—so much as is contained in Loomis's Treatise, up to the general theory of equations.

Geometry—Plane, solid and spherical; including fundamental notions of symmetry, and examples of loci and of maxima and minima of plane figures:—an equivalent of the nine books of Chauvenet's Treatise, or of the ten books of Loomis's Elements and the Appendix, up to the section on Transversals.

Trigonometry—including the analytical theory of the trigonometrical functions, and the usual formulæ; the construction and use of trigonometrical tables; and the solution of plane triangles;—so much, for example, as is contained in Wheeler's *Plane Trigonometry* (Boston, 1877), or Richards's *Plane Trigonometry* (New York, 1878).

While no entrance examination is held in the *History of England*, candidates for admission are urgently advised to make themselves as familiar as possible with that subject; as a knowledge of it is essential to the most successful prosecution of some of the studies of the course.

Candidates will be allowed the option of passing on the above-named subjects in two successive years. In such a case they must present themselves for examination at the June examination of the first year in the following subjects or parts of subjects: *History of the United States, Geography, Arithmetic, Plane Geometry, and Algebra to Quadratic Equations.*

In order to have this preliminary examination counted, candidates must pass satisfactorily on *all* the subjects; and notice must be given of the intention to divide the examination to Professor G. J. Brush, Executive Officer of the School, on or before June 15th.

In his preparation in GEOMETRY the candidate should, as far as practicable, have suitable exercises in proving simple theorems and solving simple problems for himself. It is important, too, that he should be accustomed to the numerical application of geometric principles, and especially to the prompt recollection and use of the elementary formulæ of mensuration. In TRIGONOMETRY he should be exercised in applying the usual formulæ to a variety of simple reductions and transformations, including the solution of trigonometrical equations. Readiness and accuracy in trigonometrical calculations are also of prime importance to the candidate. If the use of logarithms is postponed in his preparation till Trigonometry is taken up (which is by no means necessary or advisable), he should then have abundant application of them to all forms of calculation occurring in ordinary practice, as well as to those appearing in the solution of triangles. Finally, in all of his calculations, he should study the art of neat, orderly, and readily intelligible arrangement.

In LATIN, in order to secure the attainment of the required proficiency, the student should have such continued training in parsing as shall make him thoroughly familiar with declensions and conjugations, and accurate and ready in the application of the rules of syntax. As an additional guarantee of the proper mastery of these grammatical elements, the requirement has been adopted of "simple exercises in prose composition." By this is meant merely, such a course of elementary exercises in translation, orally and in writing, from English into Latin as, in connection with the systematic parsing just mentioned, shall necessitate a familiarity with grammatical forms and the leading principles of syntax, and thus render the reading of the six books of Cæsar (or their equivalent) more thorough and fruitful. Since this course of elementary exercises in translation is designed as a preparation for reading, and not as a sequel to it, it should be invariably begun at the earliest stage of the study of Latin. To avoid any misapprehension of the nature of the extent of the requirement, the following works are specifically, named, among which the candidate for examination may make his own selection,

These are Harkness's "Introduction to Latin Composition," 112 pages; Leighton's "Latin Lessons," 91 pages; Smith's "Principia Latina," Part I.; McClintock's "First Latin Book," 83 lessons (193 pp.). Any equivalent of these may be offered from the many useful books of a similar character. A knowledge of Prosody is not required.

The examinations for admission take place at North Sheffield Hall, on Thursday, Friday, and Saturday, June 30, July 1, 2, and on Tuesday and Wednesday, September 13, 14, 1881. Opportunity for private examinations may, in exceptional cases, be given at other times.

In 1881 examinations (for the Freshman Class only) will also be held in Chicago and in Cincinnati (beginning on Thursday, June 30, at 9 A. M.), at a place to be announced in the local newspapers of the day previous. Candidates who propose to be present are requested to send their names to Professor G. J. Brush, Executive Officer of the School, before June 15. A fee of five dollars will be charged for admission to these examinations.

Candidates for advanced standing in the undergraduate classes are examined, in addition to the preparatory studies, in those already pursued by the class they wish to enter. No one can be admitted as a candidate for a degree, later than at the beginning of the Senior year.

THE COURSES OF INSTRUCTION, occupying three years, are arranged to suit the requirements of various classes of students. The first year's work is the same for all; for the last two years the instruction is chiefly arranged in special courses. The special courses most distinctly marked out are the following:—

- (a.) In Chemistry;
- (b.) In Civil Engineering;
- (c.) In Dynamical (or Mechanical) Engineering;
- (d.) In Agriculture;
- (e.) In Natural History;
- (f.) In Biology preparatory to Medical Studies;
- (g.) In studies preparatory to Mining and Metallurgy;
- (h.) In Select studies preparatory to other higher studies.

The arrangement of the studies is indicated in the annexed scheme.

FRESHMAN YEAR—INTRODUCTORY TO ALL THE COURSES.

FIRST TERM—*German*—Whitney's Grammar and Reader. *English*—Lounsbury's History of the English Language; Exercises in Composition. *Mathematics*—Analytical Geometry. *Physics*—Atkinson's Ganot, with experimental lectures. *Chemistry*—Recitations and Laboratory Practice. *Elementary Drawing*—Practical Lessons in the Art School.

SECOND TERM—*Language, Physics, and Chemistry*—as stated above. *Mathematics*—Spherical Trigonometry (Wheeler's); Elements of Mechanics. *Physical Geography*—Lectures. *Botany*—Gray's Lessons, with Lectures. *Political Economy*—Elementary Lectures. *Drawing*—Isometric Drawing, with application to drawing from models and structures by measurement. Shading and tinting. Principles of orthographic projection. Reading of working drawings and isometric construction of objects from their orthographic projections. Sections.

For the Junior and Senior years the students select for themselves one of the following courses :

(a.) IN CHEMISTRY.

JUNIOR YEAR :

FIRST TERM—*Theoretical Chemistry*—Lectures and Recitations. *Qualitative Analysis*—Fresenius's. *Laboratory Practice*. *Blowpipe Analysis*. *German*. *French*.

SECOND TERM—*Laboratory Practice*—Quantitative Analysis. *Mineralogy*—Blowpipe Analysis and Determination of Species. Lectures. *French*. *German*.

SENIOR YEAR :

FIRST TERM—*Organic Chemistry*—Lectures and Recitations. *Agricultural Chemistry*—Recitations (optional). *Laboratory Practice*—Volumetric and Organic Analysis. *Geology*—Dana's. *Zoology*—Lectures. *French*.

SECOND TERM—*Laboratory Practice*—Mineral Analysis and Assaying. *Geology*—Dana's Manual. *Metallurgy* (optional). *Mineralogy* (optional). *French*.

(b.) IN CIVIL ENGINEERING.

JUNIOR YEAR :

FIRST TERM—*Mathematics*—Elements of the Theory of Functions ; Numerical Equations ; Differential Calculus. *Surveying*—Field Operations. *Drawing*—Descriptive Geometry, begun. *German*. *French*.

SECOND TERM—*Mathematics*—Integral Calculus. Rational Mechanics. *Drawing*—Descriptive Geometry, concluded. Topographical. *Surveying*—Topographical. *German*. *French*.

SENIOR YEAR :

FIRST TERM—*Field Engineering*—Laying out Curves. Location of line of Railroad, with calculations of Excavation and Embankment. Hencks's Field Book for Railroad Engineers. *Civil Engineering*—Resistance of Materials. Bridges and Roofs, begun. Stone Cutting, with Graphical problems. *Geology*—Dana's. *Mineralogy*—Blowpipe Analysis and Determinative Mineralogy. *French*.

SECOND TERM—*Civil Engineering*—Bridges and Roofs. Building Materials. Stability of Arches and Walls. Mahan's Civil Engineering. *Dynamics*—Principles of Mechanism. Steam Engine. *Hydraulics*—Hydraulics and Hydraulic Motors. *Drawing*—Graphical Statics. *Astronomy*—Loomis's Astronomy, with practical problems. *Mineralogy*—continued. *Geology*—Dynamic. *French*.

(c.) IN DYNAMIC ENGINEERING.

JUNIOR YEAR :

FIRST TERM—*Mathematics*—Elements of the Theory of Functions; Numerical Equations; Differential Calculus. *Surveying*—Field Practice. *Drawing*—Descriptive Geometry, begun. *German*. *French*.

SECOND TERM—*Mathematics*—Integral Calculus. Rational Mechanics. *Kinematics*—General Theory of Motion and Principles of Mechanism; Elementary Combinations of pure Mechanism; Pulleys and Belts; Gearing and forms of teeth for wheels; Parallel Motions. *Drawing*—Descriptive Geometry, concluded. *German*. *French*.

SENIOR YEAR :

FIRST TERM—*Statics*—Application of the Principles of Statics to Rigid Bodies; Elasticity and Strength of Materials; Forms of Uniform Strength; Stability of Structures; Construction of Roof Trusses, Girders, and Iron Bridges. *Machine Drawing*—Bolts and Nuts; Riveting; Journals, Axles, Shafts, Couplings, Pillow Blocks; Shaft-hangers, Pulleys; Connecting Rods and Cranks; Cross-heads; Pipe Connections; Valves; Steam Cylinders, Stuffing Boxes, Glands, etc. Shop Visits. *Blowpipe Analysis*. *French*.

SECOND TERM—*Hydrostatics and Hydrodynamics*—Equilibrium and Pressure of fluids; Hydrometers, Manometers, Gauges, etc.; Water Pressure Engines and Water Wheels; Construction of Water Reservoirs and Conduits; Measurements of Water Supply; Discharge of Pipes. *Thermodynamics*—General principle of Heat employed as a source of power; Theory of the Steam Engine; Hot Air Engines; Gas Engines. *Machine Designing*—Proportioning of Machine Parts, continued. Designing of Hoisting Engines; Shearing and Pumping Engines; complete working drawings for a high speed Steam Engine. Shop Visits and Reports. *Metallurgy*.

(d.) IN AGRICULTURE.

JUNIOR YEAR :

FIRST TERM—*Theoretical Chemistry*—Lectures and Recitations. *Qualitative Analysis*—Fresenius's. *Laboratory Practice*. *Blowpipe Analysis*. *German*. *French*.

SECOND TERM—*Laboratory Practice*—Quantitative Analysis. *Mineralogy*—Blowpipe Analysis and Determination of Species. *Physical Geography*—Lectures. *Physiology*—Huxley's. *Botany*—Lectures. *French*. *German*.

SENIOR YEAR :

FIRST TERM—*Agriculture*—Cultivation of the Staple Crops of the Northern States. Tree Planting and Forestry. *Agricultural Chemistry*—Johnson's. *Organic Chemistry*—Lectures and Recitations. *Geology*—Dana's. *Zoology*. *English*. *French*.

SECOND TERM—*Agriculture*—Laws of Heredity and Principles of Breeding; Lectures. *Geology*—Dana's. *Rural Economy*—History of Agriculture and Sketches of Husbandry in Foreign Countries; Systems of Husbandry. *Agricultural Chemistry*—Johnson's. *Geology*—Dana's. *Zoology*. *Botany*. *Microscopy*. *English*. *French*.

(e.) IN NATURAL HISTORY.

(Either Geology, Mineralogy, Zoology, or Botany, may be made the principal study, some attention in each case being directed to the other three branches of Natural History.)

JUNIOR YEAR :

FIRST TERM—*Chemistry*—Qualitative Analysis; Laboratory Practice; Recitations. *Mineralogy*—Blowpipe Analysis and Determinative Mineralogy. *Botany*—Gray's Manual; Laboratory Practice. *German*. *French*.

SECOND TERM—*Zoology*—Laboratory Practice; Recitations; Excursions (land and marine). *Botany*—Laboratory Practice; Excursions. *Physiology*—Huxley's. *Mineralogy*—continued. *Physical Geography*. *German*. *French*.

SENIOR YEAR :

FIRST TERM—*Geology*—Dana's; Excursions. *Zoology*—Laboratory Practice; Lectures; Recitations; Excursions. *Botany*—Herbarium Studies; Gray's Text-book; Excursions. *French*.

SECOND TERM—*Geology*—Dana's. *Anatomy of Vertebrates*—Huxley's. *Zoology*—Laboratory Practice; Recitations; Lectures. *Botany*—Herbarium Studies, especially in the Cryptogamous Orders; Botanical Literature; Essays in Descriptive Botany. *Meteorology*. *French*.

Besides the regular courses of recitations and lectures on structural and systematic Zoology and Botany, and on special subjects, students are taught to prepare, arrange, and identify collections, to make dissections, to pursue original investigations, and to describe genera and species in the language of science. For these purposes, large collections in Zoology and Palæontology belonging to the College are available, as are also the private botanical collections of Professor Eaton.

(f.) IN BIOLOGY—PREPARATORY TO MEDICAL STUDIES.

JUNIOR YEAR :

FIRST TERM—*Theoretical Chemistry*—Lectures and Recitations. *Qualitative Analysis*—Fresenius's; Laboratory Practice; Recitations. *Mineralogy*—Blowpipe Analysis and Determinative Mineralogy. *German*. *French*.

SECOND TERM—*Physiology*—Huxley's, with Practical Exercises. *Toxicology*—Fresenius's; Laboratory Practice; Recitations and Lectures. *Physiological Chemistry*—Sanderson's Handbook; Recitations and Laboratory Work. *Mineralogy*—continued. *Botany*—Lectures, Practical Exercises in Phenogamous Plants, and Excursions. *German. French.*

SENIOR YEAR :

FIRST TERM—*Physiological Chemistry*—continued. *Organic Chemistry*—Lectures and Recitations. *Zoology*—Lectures. *Botany*—Practical Exercises. Lectures and Excursions. *Geology*—Dana's Manual. *French.*

SECOND TERM—*Comparative Anatomy and Histology*—Laboratory Practice and Recitations. *Geology*—Dana's Manual. *Zoology*—Lectures. *Laws of Heredity and Breeding*—Lectures. *French.*

(g.) IN STUDIES PREPARATORY TO MINING AND METALLURGY.

Young men desiring to become Mining Engineers, can pursue the regular course in Civil and Mechanical Engineering, and at its close can spend a fourth year in the study of metallurgical chemistry, mineralogy, etc.

(h.) IN THE SELECT STUDIES PREPARATORY TO OTHER HIGHER STUDIES.

JUNIOR YEAR :

FIRST TERM—*Mineralogy*—Blowpipe Analysis and Determinative Mineralogy. *Astronomy. English*—Early English. *History*—Freeman's Outlines. *French. German.*

SECOND TERM—*Mineralogy*—Lectures. *Physical Geography*—Guyot; Lectures. *Botany*—Lectures; Excursions; Laboratory Practice. *English*—Chaucer, Bacon, Shakspeare. *History*—Freeman's Outlines, with Lectures. *Political Economy*—Rogers's Manual. *German. French.*

SENIOR YEAR :

FIRST TERM—*Geology*—Recitations and Excursions. *Zoology*—Lectures and Excursions. *Linguistics*—Whitney's Life and Growth of Language. *English*—Shakspeare. *History*—Constitutional History of the United States; Lectures. *Political Economy*—Lectures. *French.*

SECOND TERM—*Geology*—continued. *Meteorology*—Lectures. *Political Economy*—Lectures. *English*—Shakspeare, Milton, Dryden, Pope, and later authors. *History*—Political History of U. S.; History of Europe from 1848; Lectures. *French.*

Exercises in English Composition are required during the entire course from all the students. The preparation of graduation theses is among the duties of the Senior Year.

Lectures on Military Science and Tactics are annually given by General Abbott, and other officers of the Engineer Corps of the United States Army.

DRAWING.—The course in drawing extends through the three years. During the first term of Freshman year, the students practice free-hand drawing at the Art School building, under the direction of Professor Niemeyer, of the Yale School of the Fine Arts. After the completion of the course in free-hand drawing, instruction is given by Mr. F. R. Honey, during the second term in the elementary principles of instrumental drawing, embracing Elementary projection drawing, Isometric drawing, and Descriptive Geometry as far as Warped Surfaces. This course is obligatory upon all.

During the Junior and Senior years, instruction in drawing is obligatory only on the students in Civil and Mechanical Engineering. In the former year the system of instruction embraces shades and shadows, tinting, perspective, and warped surfaces. By this method all the problems in Descriptive Geometry are required to be worked out on the drawing-board instead of the black-board. The course extends through the entire year, and is under the direction of Mr. Honey.

In Senior year, students are required to apply the principles of drawing already obtained to works of construction, under the general supervision of the Professors of Civil and of Dynamic Engineering.

VII.

METHODS OF INSTRUCTION.

The instruction of this institution is given chiefly in small class rooms, in connection with recitations and by familiar lectures, illustrated by the apparatus at the command of the various teachers. In many studies weekly excursions are made for the purpose of collecting specimens and examining natural phenomena.

In Chemistry and Metallurgy the students work several hours daily in well-appointed laboratories, under the direct superintendence of the instructors, and are guided through systematic courses of quantitative and qualitative analysis, assaying, and the blow-pipe determination of minerals and ores.

In Botany, during the summer of Junior year, exercises in analyzing and identifying plants occur two or three times a week, followed by practice in writing characters and descriptions of plants from living specimens. Students are shown also the best methods of collecting and preserving for future study, specimens of Flowering Plants, Ferns, Mosses, Algæ, etc. In the autumn

term of Senior year the work of the summer is continued. Students are encouraged to pursue special lines of Botanical investigation, and varied assistance is rendered them according to their needs. The final examination is intended to show what they have learned, and the collections they have made are considered to be of minor importance.

In Zoology excursions are made during the third term of Junior and first term of Senior year, in company with the instructors, for the purpose of observing the habits and making collections of marine, fresh-water, and terrestrial animals of all classes. Each student is required to prepare and present for examination a collection containing a specified number of species, and illustrating the various classes of animals. He must also be able to pass an examination upon his collection, at least to the extent of explaining the classes and orders illustrated, and showing why particular specimens belong to the respective classes.

In Geology excursions are made for the purpose of examining geological phenomena and making special collections of rocks and minerals. Each student is required to pass a satisfactory examination on his collections at the end of the first term of Senior year.

In addition to the above, a course of lectures is given every winter by the professors of the schools and others, on topics of popular interest.

VIII.

TUITION CHARGES.

The charge for tuition for undergraduate students is \$150 per year, payable, \$55 at the beginning of the first and of the second term, and \$40 at the middle of the second term. The special student of Chemistry has an additional charge of \$70 per annum for chemicals and use of apparatus. He also supplies himself at his own expense with gas, flasks, crucibles, etc., the cost of which should not exceed \$10 per term. A fee of \$5 is charged members of the Freshman Class for chemicals and materials used in their laboratory practice, and the same fee is required from all (except Chemical students) who take the practical exercises in Blow-pipe Analysis and Determinative Mineralogy. A fee of \$5 a term will also be charged to the students in the Zoological laboratory, for materials and use of instruments. An additional charge of \$5 is annually made to each student for the use of the College Reading Room and Gymnasium.

For graduate students the charge for tuition is \$100 per year.

IX.**CHURCH SITTINGS.**

Free sittings for students in this department of Yale College are provided as follows: in the Center Church (Cong.); in the Trinity (Epis.); and in the First Methodist Church.

Those who prefer to pay for a sitting for a year, more or less, in the churches above mentioned, or in any other church of any denomination, will be aided on application to the Secretary of the School.

Sittings in the Gallery of the College Chapel are free as heretofore to the students of this department.

X.**DEGREES.**

Students of this department, on the recommendation of the Governing Board, are admitted by the Corporation of Yale College to the following degrees. They are thus conferred:

1. **BACHELOR OF PHILOSOPHY**: on those who complete any of the three-years courses of study, passing all the examinations in a satisfactory manner, and presenting a graduation thesis.

The fee for graduation as Bachelor of Philosophy including the fee for Triennial Catalogues, Commencement Dinners, etc., is \$10; unless the person taking the degree is also an academical graduate, when it is but \$5.

2. **CIVIL ENGINEER and DYNAMICAL ENGINEER**: The requirements for these degrees are stated on pages 17-18.

3. **DOCTOR OF PHILOSOPHY**: The requirements for this degree are stated on page 16.

XI.**TERMS AND VACATIONS.**

The next academic year begins Thursday, September 15, 1881. The first term begins eleven weeks from Commencement-day and continues fourteen weeks: the second term begins on the second Thursday in January and continues until Commencement-day, with a Spring recess—usually of eight days—including Easter. (See Calendar, p. 2.)

XII.**ANNOUNCEMENT IN RESPECT TO STATE STUDENTS.**

The scholarships established in this School in consequence of the bestowal upon it of the Congressional grants are designed to aid young men who are in need of pecuniary assistance in fitting themselves for agricultural and mechanical pursuits of life. All applicants must be citizens of Connecticut. In case there are more applicants than vacancies, candidates will be preferred who have lost a parent in the military or naval service of the United States, and next to these such as are most in need of pecuniary assistance; and the appointments will be distributed as far as practicable among the several counties in proportion to their population. The appointing Board for the current year, consisting of the Board of Visitors of the State and the Secretary of the School, will meet on June 28th, 1881, and at or about the same time in the year 1882, due notice of which will be given by publication in every county of the State. All applications should be made previous to that time. Blank forms for application will be sent, when requested, by Professor GEORGE J. BRUSH, Secretary of the Appointing Board.

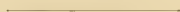
XIII.**ANNIVERSARY.**

The Anniversary of the School is held on Tuesday of the Commencement week in Yale College, when selections from the graduation theses are publicly read. The degrees are publicly conferred by the President and Fellows of Yale College on Commencement Day.

APPENDIX.



ENTRANCE EXAMINATION PAPERS.



The following are the papers for 1880, upon which applicants for admission were examined at the June and September examinations.

ARITHMETIC.

JULY, 1880.

1. (a) Select the prime numbers between 1 and 50.
(b) Find the prime factors of 6902.
 2. Find the value of $\frac{4\frac{1}{7} - 2\frac{1}{4}}{6\frac{1}{2} - 2\frac{1}{4}}$, in its simplest form.
 3. Divide 0.10724 by 0.003125.
 4. How many stones 10 inches long, 9 inches broad, and 4 inches thick, would it require to build a wall 80 feet long, 20 feet high and $2\frac{1}{4}$ feet thick, without mortar?
 5. The population of a certain town has gained 25 per cent. within the last five years. It is now 6575; what was it five years ago?
 6. Extract the square root of 3369 to three places of decimals.
 7. Give the approximate value of the meter in inches; of the gram in grains; of the kilogram in pounds avoirdupois; of the liter in liquid quarts.
- What is the weight of a liter of pure water at its maximum density?

ARITHMETIC.

SEPTEMBER, 1880.

1. Reduce $\frac{3}{9\frac{3}{10}}$ and $\frac{7}{24\frac{7}{10}}$ to their least common denominator; add the results, and express the sum decimally to four places.
2. If 8 horses consume $3\frac{1}{2}$ tons of hay in 30 days, how long will $4\frac{9}{10}$ tons last 10 horses?
3. A buys 9 per cent. stocks at 25 per cent. premium; and B buys 6 per cent. stocks at 25 per cent. discount: supposing dividends to be paid promptly, what rates of interest will they receive on their investments?
4. Calculate the square root of 2.064 to two places of decimals.
5. Calculate the cube root of 3.3 to two places of decimals.
6. How many hectoliters of grain will a bin hold whose interior length, width, and depth, are each 6 ft. 6 in.

GEOMETRY.

JULY, 1880.

[State what text-book you have studied and to what extent.]

I.—PLANE GEOMETRY.

1. (*a*) Define the symmetry of a figure with respect to an axis and with respect to a point.

(*b*) Prove that if a figure is symmetrical with respect to two axes perpendicular to each other, it is also symmetrical with respect to the intersection of these axes.

2. An angle formed by a tangent and a chord is measured by one-half the intercepted arc.

2. To bisect a given arc or angle.

4. (*a*) If a perpendicular be drawn from the vertex of the right angle to the hypotenuse of a right triangle, the two triangles thus formed are similar to each other and to the whole triangle.

(*b*) What can you say of the perpendicular as compared with the segments of the hypotenuse? Why?

(*c*) What, of either side about the right angle? Why?

5. On a given straight line to construct a polygon similar to a given polygon.

6. The circumferences of two circles are to each other as their radii, and their areas are to each other as the squares of their radii.

II.—SOLID AND SPHERICAL GEOMETRY.

7. If a straight line and a plane are parallel, the intersection of the plane with planes passed through the line are parallel to that line and to each other.

8. Define a prism. Two prisms are equal, if three faces including a trihedral angle of the one are respectively equal to three faces similarly placed including a trihedral angle of the other.

9. Every section of a sphere made by a plane is a circle.

10. Between what two limits does the sum of the angles of a spherical triangle lie? Write expressions for the surface and volume of the cylinder, cone and sphere.

NOTE.—Candidates who present themselves for the whole examination may omit questions 2, 3 and 5. Candidates who present themselves for the partial examination will confine themselves to the questions in Plane Geometry.

GEOMETRY.

SEPTEMBER, 1880.

[State what text-book you have studied and to what extent.]

1. To draw a common tangent to two given circles.
2. The bisector of an angle of a triangle divides the opposite side into segments which are proportional to the adjacent sides.
3. The area of a parallelogram is equal to the product of its base and altitude.
4. How do you find the area of a trapezoid? The areas of similar polygons are to each other in what ratio? Of all plane figures having the same area what one has the least perimeter?
5. If a straight line is perpendicular to each of two straight lines at their point of intersection, it is perpendicular to the plane of those lines.
6. A triangular pyramid is one-third of a triangular prism of the same base and altitude.
7. Define the terms *spherical excess*, and *tri-rectangular triangle*. The area of a spherical triangle is equal to its spherical excess (the right angle being the unit of angles and the tri-rectangular triangle the unit of areas).

ENGLISH.

JULY, 1880.

1. Parse the words in the following sentences :
 - (a) Many were present who had no desire to change.
 - (b) The wages of sin is death.
2. Name the parts of speech, with an illustrative example of each one.
3. Inflect throughout the pronouns of the first and second persons.
4. Give the principal parts of the verbs *lie*, *lay*, *draw*, *ride*, *thrive*, *set*, *sit*, and *go*.

ALGEBRA.

JULY, 1880.

[State what text-book you have studied and to what extent.]

1. Resolve the following expressions into factors:

$$16a^4b^3 - 24a^2bmc + 9m^2x^2; \quad 9a^2b^2 - 16a^2c^2; \quad a^3 - 8b^3.$$

2. Given $\frac{x}{a+b} + \frac{y}{a-b} = \frac{1}{a-b}$ and $\frac{x}{a+b} - \frac{y}{a-b} = \frac{1}{a+b}$; find x and y .

3. Given $\sqrt{a-x} + \sqrt{b-x} = \sqrt{\frac{b}{b-x}}$ to find x .

4. (1) From $2\sqrt{72a^2}$ take $\sqrt{162a^2}$.

- (2) Find the value of $\sqrt{2} \times \sqrt[3]{3} \times \sqrt[4]{5}$.

- (3) Divide $8a-b$ by $2a^{\frac{1}{3}} - b^{\frac{1}{3}}$.

- (4) Simplify $\frac{a^2b}{3c} \left(\frac{a^7b^4}{9c^6} \right)^{-\frac{1}{4}}$.

5. Given $\frac{3x}{2} + 4x - 8 > 3$ and $6x + \frac{5x-15}{3} < 18$ to find a superior and an inferior limit of x .

II.

6. Given $\frac{x+2}{x-2} - \frac{x-2}{x+2} = \frac{5}{6}$, to find the values of x .

7. Given $x^2 + xy = a$, $y^2 + xy = b$, to find x and y .

8. Expand $\frac{1+2x}{1-x-x^2}$ into a series by the method of indeterminate coefficients.

9. The number of permutations of n things, 3 together, is 6 times the number of combinations, 4 together; find n .

NOTE.—The first division of the paper extends as far as Quadratic Equations, and will be all that is required of candidates who propose to pass the partial examination only.

ALGEBRA.

SEPTEMBER, 1880.

1. Divide $\frac{x^4 - b^4}{x^2 - 2bx + b^2}$ by $\frac{x^2 + bx}{x - b}$.
2. Given $\frac{a+4b}{m+x} = \frac{2a-3b}{3m-y}$ and $5ax - 2by = c$ to find x and y .
3. $\sqrt{14-x} + \sqrt{11-x} = \frac{3}{\sqrt{11-x}}$ to find x .
4. Simplify $\sqrt{24} + \sqrt{54} - \sqrt{6}$; $\frac{a+b}{a-b} \sqrt{\frac{a-b}{a+b}}$;
 $a^m \sqrt[m]{x} \times b^n \sqrt[n]{y} \times c^p \sqrt[p]{z}$; $(\sqrt{-1})^4$; $(\sqrt[4]{-1})^2$.
5. Extract the square root of $4x^4 + 16a^4 - 12ax^3 - 24a^3x + 25a^2x^2$.
6. Solve the equation $3x^2 + 2x - 9 = 76$.
7. If $\frac{a_1}{b_1} = \frac{a_2}{b_2} = \frac{a_3}{b_3} \dots = \frac{a_n}{b_n} = r$, show that

$$\frac{a_1 + a_2 + a_3 + \dots + a_n}{b_1 + b_2 + b_3 + \dots + b_n} = r.$$
8. Having the first term (a), the ratio (r), and the last term (l), of a geometric progression, find the sum (s) and the number (n) of the terms.
9. Expand $\frac{b}{\sqrt{x^2 + a^2}}$ into a series by the binomial formula.
10. Solve the equations $x^y = y^x$, and $x^3 = y^2$.

TRIGONOMETRY.

JULY, 1880.

[State what text-book you have studied and to what extent.]

1. Given $\tan A = \sqrt{3}$; find all the other functions of A when A is an angle of the 3d quadrant.
2. Given $\sin 30^\circ = \frac{1}{2}$; find the sine and cosine of $\pm 60^\circ, 120^\circ, 150^\circ, 210^\circ, 240^\circ, 300^\circ, 330^\circ$.
3. Deduce the formula $\sin x + \sin y = 2 \sin \frac{1}{2}(x+y) \cos \frac{1}{2}(x-y)$.
4. Show that $\tan^{-1}x - \tan^{-1}y = \tan^{-1} \frac{x-y}{1+xy}$.
5. Write the formulæ for solving the several cases of right triangles.
6. In a plane triangle the side b is 304, the side c 280.3 and the included angle A is 100° . Find the remaining parts.

TRIGONOMETRY.

SEPTEMBER, 1880.

[State what text-book you have studied and to what extent.]

1. The length of an arc is 1.5 that of its radius; what is the number of degrees in the angle it subtends?
2. Find all of the functions of the following angles:
 $\pm 45^\circ, 135^\circ, 225^\circ, 315^\circ$.
3. Given $\sin A = m \sin B$ and $\tan A = n \tan B$; find $\sin A$ and $\cos B$.
4. Deduce the formulæ for the sine of the sum of two angles in terms of the sines and cosines of the angles.
5. Given $A = \sin^{-1} \frac{3}{5}$, $B = \sin^{-1} \frac{4}{5}$, to show that $A + B = 90^\circ$.
6. In a triangle ABC , given $a = 309$, $b = 450$, and $A = 27^\circ 50'$, to first determine whether the triangle admits of more than one solution, and then solve it.

LATIN.

JULY, 1880.

I. Translate as literally as possible—

a. Quum ea ita sint, tamen, si obsides ab iis sibi dentur, uti ea, quae polliceantur, facturos intelligat, et si *Aeduis* de injuriis, quas ipsis sociisque eorum intulerint, item si Allobrogibus satisfaciant, sese cum iis pacem esse facturum. Divico respondit:

5 Ita Helvetios a majoribus suis institutos esse, uti obsides accipere, non dare, consuerint; ejus rei populum Romanum esse *testem*.

b. Ibi vadis repertis partem suarum copiarum transducere conati sunt, eo consilio, uti, si possent, castellum, cui praeerat
10 Quintus Titurius legatus, expugnarent, pontemque interseinderent; si minus potuissent, agros Remorum popularentur, qui magno *nobis usui* ad bellum gerendum erant, commeatuque nostros prohiberent.

c. Impeditis hostibus propter ea, quae ferebant, onera, subito
15 quibus *portis* eruptionem fieri jubet. Factum est opportunitate loci, hostium inscientia ac defatigatione, virtute militum, et superiorum pugnarum *exercitatione*, ut ne unum quidem nostrorum impetum ferrent ac statim terga verterent.

d. Dum in his locis Caesar *navium* parandarum causa moratur, ex magna parte Morinorum ad eum legati venerunt, qui se de superioris temporis consilio excusarent, quod homines barbari et nostrae *consuetudinis* imperiti bellum populo Romano fecissent, seque ea, quae imperasset, facturos pollicerentur.

e. Britanniae pars interior ab iis incolitur, quos natos in
25 insula ipsi memoria *proditum* dicunt; maritima pars ab iis, qui praedae ac belli *inferendi* causa ex Belgis transierant; qui omnes fere iis nominibus civitatum appellantur, quibus orti ex civitatibus eo pervenerunt, et, bello illato, ibi permanserunt atque agros colere coeperunt.

f. Ambiorix copias suas *judicione* non conduxerit, quod proelio dimicandum non existimarit, an tempore exclusus et repentino equitum adventu prohibitus, quum reliquum *exercitum* subsequi crederet, dubium est; sed certe dimissis per agros nuntiis sibi quemque consulere jussit.

II. 1. Decline *obsides* (1), *majoribus* (5), *loci* (16).

2. Compare *imperiti* (22), *interior* (24), *certe* (33).

3. Write the synopsis, active and passive, of *intelligat* (2).

4. State the mood and tense of the following: *consuerint* (6), *praeerat* (9), *ferrent* (18), *imperasset* (23), *existimarit* (31).

5. Give the principal parts of the following: *polliceantur* (2), *repertis* (8), *interseinderent* (10–11), *gerendum* (12), *verterent* (18), *incolitur* (24), *orti* (28), *colere* (29), *existimarit* (31), *exclusus* (31), *crederet* (33), *consulere* (34).

6. State the construction of all italicized words.

7. Define indirect statement (*oratio obliqua*), and quote an example from the above text.

8. Convert into direct statement (*oratio directa*) the example quoted in answer to question seventh.

LATIN.

SEPTEMBER, 1880.

I. Translate as literally as possible—

a. Eadem secreto ab aliis quaerit; reperit esse vera: Ipsum esse Dumnorigem, summa *audacia*, magna apud plebem propter liberalitatem gratia, cupidum rerum novarum: complures annos portoria reliquaue omnia Aeduorum vectigalia parvo
5 *pretio* redempta habere, propterea quod, illo licente, contra liceri audeat nemo.

b. Quum ab his quaereret, quae civitates, quantaque in armis essent et *quid* in bello possent, sic reperiebat: Plerosque Belgas esse ortos ab Germanis, Rhenumque antiquitus trans-
10 ductos propter loci fertilitatem ibi consedissee, Gallosque, qui ea loca incolerent, expulisse.

c. His rebus gestis, quum omnibus de causis Caesar pacatam Galliam existimaret, superatis Belgis, expulsis Germanis, victis in Alpibus Sedunis, atque ita inita *hieme* in Illyricum profectus
15 esset, quod eas quoque *nationes* adire et regiones cognoscere volebat, subitum bellum in Gallia coortum est.

d. Germanico bello confecto, multis de causis Caesar statuit *sibi* Rhenum esse transeundum; quarum illa fuit justissima,
20 quod, quum videret Germanos tam facile impelli, ut in Galliam venirent, suis quoque *rebus* eos timere voluit, quum intelligerent et posse et audere populi Romani *exercitum* Rhenum transire.

e. Utuntur aut *aere* aut tales ferreis ad certum pondus examinatis pro nummo. Nascitur ibi plumbum album in
25 mediterraneis regionibus, in maritimis *ferrum*, sed ejus *exigua* est copia; aere utuntur importato. Materia cujusque generis, ut in Gallia, est, praeter fagum atque abietem.

f. Ac fuit antea tempus, quum Germanos Galli *virtute* superarent, ultro bella inferrent, propter hominum multitudinem
30 agrique inopiam trans Rhenum colonias mitterent. Itaque ea, quae fertilissima Germaniae sunt, loca circum Hercyniam silvam, Volcae Tectosages, occupaverunt atque ibi consederunt.

II. 1. Decline *vectigalia* (4), *ea* (11), *hieme* (14).2. Compare *parvo* (4), *facile* (20), *fertilissima* (31).3. Write the synopsis, active and passive, of *habere* (5).4. State the mood and tense of the following: *reperit* (1), *audeat* (6), *videret* (20), *superarent* (28-29), *inferrent* (29).5. Give the principal parts of the following: *quaerit* (1), *reperit* (1), *audeat* (6), *incolerent* (11), *coortum* (16), *confecto* (17), *impelli* (20), *videret* (20), *intelligerent* (21), *nascitur* (24), *consederunt* (32).

6. State the construction of all italicized words.

7. Define indirect statement (*oratio obliqua*), and quote an example from the above text.8. Convert into direct statement (*oratio directa*), the example quoted in answer to question seventh.

LATIN EXERCISES.

JULY, 1880.

1. The Helvetians¹ move² (their) camp³ from⁴ this⁵ place⁶.
2. Cæsar does⁷ the same⁸ (thing).
3. Cæsar sends-forward⁹ all¹⁰ (his) cavalry¹¹.
4. The cavalry was sent-forward by¹² Cæsar.
5. Cæsar will move (his) camp and¹³ send-forward all (his) cavalry.
6. The Helvetians having moved (their) camp¹⁴, Cæsar did the same (thing).
7. Cæsar said¹⁵ he would move his camp.
8. (Rewrite sentence seventh so as to illustrate direct statement).
9. The Helvetians say: "The Roman¹⁶ people¹⁷ is a witness¹⁸."
10. (Rewrite sentence ninth so as to illustrate indirect statement).

¹ Helvetius.	⁷ facere.	¹³ que.
² movere.	⁸ idem.	¹⁴ use subjunctive with <i>quum</i> .
³ castra.	⁹ præmittere.	¹⁵ dicere.
⁴ ex.	¹⁰ omnis.	¹⁶ Romanus.
⁵ is.	¹¹ equitatus.	¹⁷ populus.
⁶ locus.	¹² a.	¹⁸ testis.

LATIN EXERCISES.

SEPTEMBER, 1880.

1. Labienus¹ fortifies² the camp³.
2. The camp is fortified by⁴ Labienus.
3. Labienus set-out⁵ against⁶ the enemy⁷.
4. Labienus ascertained⁸ the design⁹ of the enemy (plural).
5. Labienus, having ascertained¹⁰ the design of the enemy (plural), fortifies (his) camp.
6. Labienus set-out with¹¹ five¹² cohorts¹³.
7. Labienus said¹⁴ he would set-out with five cohorts.
8. (Rewrite sentence seventh so as to illustrate direct statement).
9. Labienus says: "I will move¹⁵ the camp at day-break¹⁶."
10. (Rewrite sentence ninth so as to illustrate indirect statement).

¹ Labienus.	⁷ hostis.	¹² cohors.
² communire.	⁸ cognoscere.	¹³ dicere.
³ castra.	⁹ consilium.	¹⁴ movere.
⁴ a.	¹⁰ cum.	¹⁵ prima lux.
⁵ proficisci.	¹¹ quinque.	¹⁶ use <i>ablative absolute</i> .
⁶ contra.		

HISTORY OF THE UNITED STATES.

JULY, 1880.

1. What territory has the United States acquired by purchase? by conquest? by annexation?

2. State the causes of (1) the French and Indian War; (2) the Revolutionary War; (3) the War of 1812.

3. Arrange the following events in the order in which they occurred, with their dates: admission of California to the Union, assembling of the first Continental Congress, acquisition of Florida, second election of Monroe, opening of the Erie Canal, capture of Atlanta, death of Daniel Webster.

4. What was the Wilmot Proviso?

5. What Vice-Presidents were afterward elected Presidents?

6. Give the names of the opposing political parties in 1800; in 1840; in 1860.

HISTORY OF THE UNITED STATES.

SEPTEMBER, 1880.

1. What territory was granted by James I. to the London Company? to the Plymouth Company?

2. Describe the settlement of Virginia.

3. Arrange the following events in the order in which they occurred, with their dates: surrender of Cornwallis, the admission of West Virginia to the Union, the Whiskey Rebellion, the negotiation of Perry's treaty with Japan, the adoption of the Constitution.

4. When and where was the Confederate Government formed?

5. What was the Compromise of 1850?

6. What President was impeached? What Presidents were elected by the Federalist party?

GEOGRAPHY.

JULY, 1880.

1. Bound the State of Mississippi; name its larger cities, and tell how they are situated.
 2. Where is the Cape of Good Hope; Cape May; Cape St. Lucas; Cape Race?
 3. What countries of America border on the Pacific Ocean?
 4. Where does the River Rhine rise, run and empty; and what countries does it touch?
 5. What countries of Europe touch the Mediterranean Sea?
 6. Where are the following cities: Melbourne, Milwaukee, Havre, Valparaiso, Cairo?
-

GEOGRAPHY.

SEPTEMBER, 1880.

1. Bound the State of Virginia; what are some of its larger cities, and how are they situated? and what are some of the principal rivers in it or on its borders?
2. What states (of the U. S.) border on the Gulf of Mexico? name them in their order, beginning with Texas.
3. Where does the Missouri river rise? describe the direction of its course; what states and territories does it pass through or touch?
4. Where are the following European cities, and how are they situated: Bremen, Venice, Cologne, Havre, Hamburgh?
5. Where are the Aleutian Islands? the Azores? the Bermudas? the Philippines? the Bahamas?
6. Bound British India. Give the names of some of its principal rivers, mountains, and cities, and tell how each is situated.



HARTFORD HOSPITAL.

TWENTY-FIFTH ANNUAL REPORT

OF THE

EXECUTIVE COMMITTEE

OF THE

HARTFORD HOSPITAL,

PRESENTED TO THE CORPORATION

AT THEIR

Annual Meeting, December 8, 1880.

HARTFORD, CONN.:

PRESS OF THE CASE, LOCKWOOD & BRAINARD COMPANY.

1881.

OFFICERS OF THE CORPORATION.

CHARLES H. NORTHAM, *President.*
EDSON FESSENDEN, *Vice-President.*
WARD W. JACOBS, *Secretary and Treasurer.*

EXECUTIVE COMMITTEE.

EDSON FESSENDEN,
GEORGE B. HAWLEY,
CHARLES H. NORTHAM.

COMMITTEE ON FINANCE.

C. H. NORTHAM,
EDSON FESSENDEN,
GEORGE M. BARTHOLOMEW.

AUDITORS.

GEORGE M. BARTHOLOMEW,
HENRY KENEY.

LIBRARIAN.

GURDON W. RUSSELL.

DIRECTORS CHOSEN AT THE ANNUAL MEETING, DEC. 8, 1880.

G. W. RUSSELL,	HENRY KENEY,
CHARLES H. NORTHAM,	ROLAND MATHER,
G. B. HAWLEY,	JONATHAN B. BUNCE,
EDSON FESSENDEN,	HENRY C. ROBINSON,
CHARLES M. POND,	GEORGE M. WELCH,
GEORGE SEXTON,	HENRY K. MORGAN.
MORGAN G. BULKELEY, <i>ex-officio.</i>	

VICE-PRESIDENTS FOR LIFE BY SUBSCRIPTION OF FIVE HUNDRED DOLLARS
AND UPWARDS, ALSO DIRECTORS FOR LIFE.

*CHESTER ADAMS,	HUNT, HOLBROOK & BARBER,
T. M. ALLYN,	R. W. H. JARVIS,
*A. S. BECKWITH,	H. & W. KENNEY,
CHARLES BOSWELL,	C. C. LYMAN,
*LEE & *BUTLER,	*WILLIAM T. LEE,
GEORGE M. BARTHOLOMEW,	*SAMUEL MATHER,
*JAMES G. BOLLES,	C. H. NORTHAM,
*JOHN BEACH,	J. M. NILES,
C. N. BEACH,	*J. S. NILES,
*GEORGE BEACH,	*H. A. PERKINS,
J. SEYMOUR BROWN,	JOSEPH PRATT,
*SAMUEL COLT,	DANIEL PHILLIPS,
CHENEY BROTHERS,	CHARLES M. POND,
*LEONARD CHURCH,	THOMAS SMITH,
*JOSEPH CHURCH,	*JOSEPH TRUMBULL,
GEORGE H. CLARK,	SAMUEL I. TUTTLE,
Mrs. SAMUEL COLT,	WILLIAM F. TUTTLE,
SAMUEL COIT,	Miss MARY W. WELLS,
*ERASTUS COLLINS,	WOODRUFF & BEACH,
FRANCIS B. COOLEY,	*THOMAS S. WILLIAMS,
CALVIN DAY,	*DAVID WATKINSON,
THOMAS M. DAY,	*JOHN WARBURTON,
*FOSTER & CO.,	*ROBERT WATKINSON,
*JAMES GOODWIN,	*MARY A. WATKINSON,
*JOHN H. GOODWIN,	*OSWIN WELLES,
G. B. HAWLEY,	*N. M. WATERMAN,
*ELLERY HILLS,	*Miss E. M. WATKINSON,
*JAMES B. HOSMER,	*Mrs. MARIA WATKINSON,
*EDMUND G. HOWE,	*TERTIUS WADSWORTH.

DIRECTORS FOR LIFE BY SUBSCRIPTION OF TWO HUNDRED DOLLARS AND
UPWARDS.

C. H. BRAINARD,	E. N. KELLOGG,
*CHARLES BENTON,	GEORGE S. LINCOLN & CO.,
BOLLES & SEXTON,	*SIMEON L. LOOMIS,
HIRAM BISSELL,	*Mrs. JOSEPH MORGAN,
BIRCH & BRADLEY,	ROLAND MATHER,
J. G. BATTERSON,	J. & M. MERRIMAN,
*E. A. BULKELEY,	*WILLIAM MATHER,
*THOMAS K. BRACE,	*JOHN M. NILES,
*LUCIUS BARBOUR,	*C. F. POND,
CASE, TIFFANY & CO.,	*IRA PECK,

* Deceased.

*ELISHA COLT,
 *NEWTON CARTER,
 H. KENDALL CARTER,
 *WILLIAM L. COLLINS,
 CHARLES COLLINS,
 *DANIEL P. CROSBY,
 JULIUS CATLIN,
 *AUSTIN DUNHAM,
 LEONARD DANIELS,
 *DAY, GRISWOLD & CO.,
 *JAMES DIXON,
 EDSON FESSENDEN,
 *EBENEZER FLOWER,
 *S. W. GOODRIDGE,
 G. F. HAWLEY,
 *ISAAC HILLS,
 *HUNGERFORD & CONE,
 NELSON HOLLISTER,
 REV. JAMES HUGHES,
 *H. HUNTINGTON,

*FRANCIS PARSONS,
 *GUY R. PHELPS,
 Miss ESTHER PRATT,
 E. M. REED,
 HENRY C. ROBINSON,
 *E. C. ROBERTS,
 *ROGERS BROTHERS,
 *ELISHA K. ROOT,
 *E. G. RIPLEY,
 CHARLES SEYMOUR,
 *Miss ELIZA K. SHEPARD,
 *WILLIAM L. STORRS,
 E. TAYLOR & CO.,
 *O. G. TERRY,
 *ISAAC TOUCEY,
 *MILES A. TUTTLE,
 WILLIAM W. TURNER,
 *SAMUEL S. WARD,
 GEORGE M. WELCH,
 *JAMES H. WELLS,

*Deceased.

Vacancies are occurring in the training-school for nurses.
 Applications for the position of pupil-nurses are solicited.
 See page 17.

OFFICERS
OF THE
HARTFORD HOSPITAL.

SUPERINTENDENT.
LEANDER HALL.

CONSULTING PHYSICIANS AND SURGEONS.
GURDON W. RUSSELL, M.D., E. K. HUNT, M.D.
GEORGE B. HAWLEY, M.D., A. W. BARROWS, M.D.

VISITING PHYSICIANS AND SURGEONS.
P. M. HASTINGS, M.D., W. A. M. WAINWRIGHT, M.D.,
J. C. JACKSON, M.D., GEORGE F. HAWLEY, M.D.,
GEORGE C. JARVIS, M.D., H. S. FULLER, M.D.

OPHTHALMIC AND AURAL SURGEON.
W. T. BACON, M.D.

RESIDENT PHYSICIAN AND SURGEON. ASST. RESIDENT SURGEON.
DWIGHT W. HUNTER, M.D. JAMES RAMSAY, M.D.

LADY SUPERINTENDENT OF TRAINING-SCHOOL.
Mrs. F. A. TUTTLE.

APOTHECARY.
H. W. FULLER.

STEWARD.
WM. H. PORTER.

The hospital reports were first numbered from the completion of the first building, but this report is numbered from 1855, when the institution was first organized.

TWENTY-FIFTH ANNUAL REPORT,

ENDING WITH THE FISCAL YEAR SEPT. 30, 1880.

A SUMMARY

OF THE REPORTS OF THE HARTFORD HOSPITAL, ISSUED BY THE EXECUTIVE COMMITTEE DURING THE LAST TWENTY-FIVE YEARS, INCLUDING THE REPORT OF 1880 TO THE CORPORATION AT THEIR ANNUAL MEETING, DECEMBER 8, 1880.

SELECTION OF SITE.

In the Spring of 1854 the terrible accident which was caused by the explosion of the steam boilers of the car-factory at Dutch Point, aroused the citizens of Hartford to the necessity of providing a place where the sick and afflicted could receive care and treatment. At that time there were no accommodations where the many mangled and dying, caused by this accident, could be conveyed, where they would receive the attention and surgical aid their situation demanded. Soon after this accident the Hartford City Medical Society appointed a committee to make some arrangement for the establishment of a City Hospital.

About this time David Watkinson, a wealthy and benevolent citizen of Hartford, had expressed his intention to give by will \$40,000, to establish a hospital in the city. At a gathering of the members of Christ Church, subsequent to the meeting held by the Medical society, a few benevolent gentlemen organized a society to provide a home for the sick.

May 2, 1854, a public meeting was called, addressed especially to all interested in the establishment of a hospital. This meeting, at which the Mayor presided, was well attended, and the subject fully discussed. Many physicians and prominent citizens took part, and demonstrated the necessity of such an institution. At this meeting a committee was appointed to draft a constitution and charter. At an adjourned meet-

ing May 9th, this committee reported the proposed constitution and charter, which were adopted, and a committee appointed to present them to the General Assembly, who at their May session, 1854, incorporated the Hartford Hospital.

At a meeting of the incorporators, viz., David Watkinson, Ebenezer Flower, A. S. Beckwith, S. S. Ward, A. W. Butler, A. M. Collins, Wm. T. Lee, Job Allyn, Samuel Colt, James B. Crosby, Albert Day, Chester Adams, James G. Bolles, George Beach, Thomas Smith, Jonathan Goodwin, A. W. Birge, Lucius Barbour, and Charles T. Hillyer, held February 20, 1855, the organization of the Hartford Hospital was completed by the appointment of twelve directors, viz., Francis Parsons, William T. Lee, Albert Day, Samuel S. Ward, Eliphalet A. Bulkeley, Gurdon W. Russell, Chester Adams, George B. Hawley, James G. Bolles, Myron W. Wilson, Jonathan Goodwin, and Lucius F. Robinson.

At the directors' meeting, July 16, 1855, Chester Adams, G. B. Hawley and A. S. Beckwith were appointed a committee to select a site for the permanent establishment of the hospital. After examining many locations and spending much time, David Watkinson asked Dr. Hawley if the Coggswell lot (the present hospital site) would be a desirable place for the building. The Doctor replied that it would be very acceptable. Within three days the Doctor received a note from Mr. Watkinson, stating that he had purchased the lot, for which he had given his obligation for \$16,000, and expected the hospital would meet this obligation within three weeks. A directors' meeting was immediately called and arrangements were completed by which the hospital was favored with the best location in the city for this purpose.

COST OF BUILDING.

When the hospital was organized, February 20, 1855, the first duty was to procure money to purchase a site, erect buildings, and provide means to defray current expenses. In our poverty we trusted that the benevolent citizens would supply our wants. At a directors' meeting, held March 27, 1855, Chester Adams, G. B. Hawley, and Lucius F. Robinson were appointed

a committee to apply to the General Assembly of that year for assistance from the State. The application resulted in the appropriation of \$10,000 from the State treasury, to be paid when \$20,000 should be raised by private munificence.

At a directors' meeting, August 24, 1855, Chester Adams, G. B. Hawley, and A. S. Beckwith were appointed to solicit subscriptions. These gentlemen presented the subject to a large portion of our citizens. This call was responded to in a spirit of generosity by pledging \$41,000 to erect buildings for the purpose of relieving suffering.

On the 4th of December, 1855, James B. Hosmer, S. S. Ward, G. B. Hawley, Edson Fessenden, and Chester Adams were appointed a committee to procure plans and specifications for suitable accommodations for the sick. The services of W. Russell West, architect, were procured. Mr. West devoted much time and study in perfecting plans. He was peculiarly fortunate in favoring us with a building which is especially adapted for hospital purposes.

The corner-stone of the hospital was laid by Governor Buckingham, April, 1857, in the presence of many members of the legislature, then in session, and a large assembly of citizens. Appropriate addresses were made by Hon. Henry C. Deming, G. B. Hawley, H. M. Knight and others. In some future period, time will develop the many precious articles placed under the corner-stone, the view of which will gladden generations yet unborn.

In April, 1859, the hospital building was dedicated for its blessed work, by addresses which were published in the report of that year.

The center building and north wing were first erected of Portland brown stone. The walls were of first-class rubble masonry. They accommodated forty-four patients together with all appliances for their care and treatment. These buildings cost \$34,000, and the land with additions cost \$16,738, which expense was paid with the \$41,000 subscription, and the \$10,000 given by the State.

In consequence of the civil war, the demand for hospital

necessities were greatly increased, and many maimed, wounded, and sick soldiers were received.

In 1868-9, the generous and liberal citizens were again called upon, and \$86,200 was subscribed for additions to the building. \$20,000 was received from the State for the same purpose, which sums amounted to \$106,200. In 1868, '69, and '70, the south wing, with two east wings, were added, and the laundry was built, with many other improvements, at a cost of \$165,065. Deduct from this sum \$106,200 which had been given for building purposes, left the hospital in debt on building account, \$58,865. In 1871, \$20,000 was received from the State, which, deducted from \$58,865, leaves \$38,865 to be paid by donations. With these increased accommodations the hospital furnished room for one hundred patients.

In 1875 the institution was again crowded beyond endurance. Patients must either be discharged, or increased accommodations furnished.

It was decided to erect a surgical ward, and a ward for special cases, for which there was an urgent demand. These wards were added in 1876, at a cost of \$25,000, and accommodated twenty-eight patients in the main ward, and eight in the special ward.

As the operating room was not adapted for the purpose designed, it was decided in 1880 to build a new one, and by so doing to furnish needed accommodation for the training school for nurses.

The operating room was built for \$3,500. The entire cost of hospital buildings to the present time, including grading, laundry, accommodations for training school, etc., is \$227,565. The site, seven acres, cost \$16,738; total cost of building and site, \$244,303. Of this sum \$50,000 was received from the State, and \$127,200 was received by private subscription, for building purposes; total, \$177,200. This leaves a balance of \$67,103 which was paid from the fund.

PATIENTS.

The society for providing a home for the sick abandoned their organization April 1, 1856, and presented their furni-

ture to the hospital. The building formerly occupied by the old society was then hired for hospital purposes, in which patients were received two years and seven months, previous to the erection of new buildings. During this time 77 patients received hospital treatment. As our winter accommodations were not appropriate for the sick, it was decided to discontinue the reception of patients November, 1858, until the new buildings were completed.

The hospital buildings were first opened for patients August 1, 1860, and the report for that year was not published.

During the winter of 1862, the institution received 258 soldiers, who were sick from an epidemic of measles, which prevailed in the regiment encamped in West Hartford, previous to their departure to the front. Since the organization of the hospital, 7,115 patients have received the benefits of the institution, 4,659 have been discharged recovered, 812 improved, 475 not improved, but have been cared for under most trying circumstances; 874 have died surrounded with all the comforts, care, and attention that watchful kindness could bestow.

The average number of patients during the last ten years has been $90\frac{3}{10}$. Of the 874 deaths $28\frac{1}{4}$ per cent. were from consumption. As this is a lingering and distressing disease, a large number of this class sought relief in the institution. In 1873 the first case of intermittent fever was admitted. These admissions were yearly increased as will be seen by the following statistics; $3\frac{1}{4}$ per cent. of those admitted in 1873 were cases of intermittent fever, 1874, 2 per cent., 1875, 2 per cent., 1876, $2\frac{1}{3}$ per cent., 1877, $4\frac{3}{4}$ per cent., 1878, $8\frac{1}{4}$ per cent., 1879, $9\frac{2}{3}$ per cent., and 1880, $9\frac{2}{3}$ per cent.

The admissions of typhoid fever have diminished as the cases of intermittent fever have increased. Of all the admissions of patients to the institution in 1872, $2\frac{1}{3}$ per cent. were typhoid fever. In 1873, $3\frac{1}{2}$ per cent., in 1874, $6\frac{1}{4}$ per cent., 1875, 4 per cent., 1876, 2 per cent., 1877, $\frac{2}{3}$ per cent., 1878, 1 per cent., 1879, $1\frac{1}{4}$ per cent., and in 1880, $1\frac{5}{8}$ per cent.

Since the admission of intermittent fever, the fever cases have assumed a bilious and typho-malarial character.

Frequent cases of Bright's disease have been admitted, both in acute and chronic form. Since 1868, 263 children have been born in the institution, 120 males, 143 females.

CURRENT EXPENSES.

Since the organization of the hospital, February 20, 1855, the current expenses have amounted to \$437,579. This does not include rent of building or repairs and improvements. There is no compensation for outside management, and the services of physicians and surgeons are free. This simply includes the daily running expenses. \$65,008 has been received from patients who were able to pay part or the whole of their board, which includes medical and surgical treatment, medicine, board, washing, nursing, care, and continual watching.

The State has paid for current expenses, \$49,745 for the care of the sick from all parts of the State, who are constantly seeking relief in the institution, and have no special claim on hospital charity. Humanity demands that this class should receive care and treatment.

The various towns of the State have paid \$73,610 for accommodations for those who from misfortune have been cast upon this charity. The towns pay \$4.00 per week, when the actual cost to the institution is from \$6.00 to \$7.00 per week. In large cities, where the poor receive these benefits, the cost varies from \$6.00 to \$10.00 per week, without including several hundred thousands of dollars for building purposes.

During and since the war, \$75,064 has been received from the State for the care of soldiers. The hospital has paid out in money \$5,672 more than has been received from the State for this care and treatment. This amount, paid by the State for soldiers, includes no compensation for cost of building, medical and surgical attendance, or outside management. There has been received \$3,921 for care of seamen, \$4,027 from sundry sources. The total of the above receipts is \$270,376, which added to \$180,370, the amount received from the fund amounts to \$450,746. Deduct the current expenses, \$437,579 from the total receipts, leaves \$13,167 to partially defray the annual expenses for repairs, improvements, and furnishing.

Since the organization of the hospital, there has been received from all sources, for site, building purposes, and current expenses, \$627,946. This includes income from the fund. The whole amount paid for site, buildings, and current expenses, amounts to \$695,049. This total income deducted from total expenses, leaves the hospital in debt \$67,103, which has been paid from the fund.

Most of the patients being supported wholly or partially by charity, the hospital cannot continue its blessed work of relieving suffering unless the fund increases in proportion to the growing demand for this charity.

TRAINING SCHOOL.

In March, 1877, the Directors introduced into the Hospital a training-school for nurses. They examined the various systems adopted in Europe and this country, and selected the one in which the lady superintendent is the head of the nursing corps, subject to the regular authority of the hospital.

Since the organization of the school, seven trained nurses have graduated, and thirteen pupil-nurses are continually occupied in caring for the sick in the wards.

The pupil-nurses are admitted for two years, which is the shortest time the pupil can pass through the regular course of study which is necessary to qualify them to perform the duties of trained nurses, and to enable them to pass the examination necessary before receiving their diplomas. The first year they receive \$10 per month, the second year \$14 per month, with board, washing, etc. All the nursing, in both male and female wards, is performed by the nurses' school, with the assistance of orderlies. Since its organization there has been a decided improvement in the order and neatness of the wards, and especially in everything pertaining to nursing and comfort of patients. The second year the pupils have an opportunity to become familiar with family-nursing, under trained instruction. The compensation of \$10 per week received for this service belongs to the Hospital, which nearly rewards the institution for time spent in instructing pupils in the art of nursing, in studying text-books, recitations, lec-

tures, etc. During the last three years, \$6,103 has been paid the pupil-nurses for services in the wards, and \$3,670 has been returned to the Hospital from money earned by the pupils in family-nursing. The money thus received by the Hospital for family-nursing, and the amount paid pupil-nurses for services in the Hospital, makes the school independent, and above the necessity of public charity. Thus far, the Hospital has been unable to supply the constant demand for trained nurses.

OFFICERS.

At the May session of the Legislature, 1854, nineteen persons were appointed corporators of the Hospital. Of these, two only remain to survey the works of the last twenty-five years, viz.: Charles T. Hillyer, President of the Charter Oak Bank, and Thomas Smith, one of our worthy and benevolent citizens.

February 25th, 1855, the Hospital was organized by appointing twelve directors. On the 27th of the same month, these directors chose the following officers of the institution: Francis Parsons, President; William T. Lee, Vice-President; Flavius A. Brown, Secretary and Treasurer. Executive Committee: Chester Adams, George B. Hawley, and Lucius F. Robinson. Of the directors and officers but two are now living, Gurdon W. Russell and George B. Hawley.

Francis Parsons was President six years, from the first organization until his death. April 8th, 1861, James B. Hosmer was elected President. He filled the office for sixteen years. At his death, Charles H. Northam was elected President, December 11, 1878, and continues to hold the office at the present time. F. A. Brown performed the duties of Secretary and Treasurer twenty-five years, faithfully, and without compensation, until his death. July, 1880, Ward W. Jacobs was elected Secretary and Treasurer, which position he at present occupies. Lucius F. Robinson died within the year he was elected member of the Executive Committee. April, 1856, Edson Fessenden was elected in his place. Chester Adams was an active member of the Committee until his death in 1870, when Charles H. Northam was elected in

his place, and still continues a member of the Committee, with G. B. Hawley and E. Fessenden. Mr. Adams remembered the Hospital with the princely gift of \$68,000.

At a directors' meeting held April, 1855, the following physicians were elected on the medical and surgical staff: S. B. Beresford, G. W. Russell, G. B. Hawley, E. K. Hunt, and Myron W. Wilson. Of the six physicians first elected, all are living, excepting S. B. Beresford and M. W. Wilson. In 1856, David Crary was elected to fill the vacancy caused by the death of Dr. Wilson.

At a directors' meeting, April, 1863, Dr. Crary resigned his position on the staff, and P. M. Hastings was chosen in his place. At a directors' meeting, 1871, H. P. Stearns and J. C. Jackson were added to the staff. In 1873, H. P. Stearns resigned his position on the staff, in consequence of being appointed Superintendent of the Retreat. The same year, G. C. Jarvis, W. A. M. Wainwright, and G. F. Hawley were appointed physicians and surgeons to the Hospital.

In 1874, H. S. Fuller was elected as a member of the staff, in the place made vacant by the death of Dr. Beresford.

In 1879, the oculist and aurist department was permanently established, and W. T. Bacon was appointed to take charge of that department.

During the last eighteen years, 6,812 patients have been cared for in the Hospital, 64,954 weeks, at an average cost of \$6.53 per week. It is impossible to estimate the amount of suffering relieved by this charity. It is a great satisfaction to know that money given for hospital purposes is used directly to relieve suffering, and the disbursements are watched over by those whose only interest is to restore the sick to health, and the maxim, "He that giveth to the poor lendeth to the Lord," will be doubly verified to those whose who bestow their bounty to provide for the sick and destitute.

EDSON FESSENDEN,
GEORGE B. HAWLEY, { *Ex. Com.*
CHAS. H. NORTHAM, {

RULES FOR PUPILS OF THE TRAINING SCHOOL FOR NURSES, HARTFORD HOSPITAL.

The Directors of the Hartford Hospital have made arrangements for giving, at the Hospital, two year's training to women desirous of becoming professional nurses.

Persons wishing to receive this course must apply either to the superintendent of the Hospital, or to the lady superintendent of the nurses' school, upon whose approval they will be accepted as pupils in the Hospital.

Candidates must be over twenty-one and under thirty-five years of age. They must be of sound health, and must present, on application, a certificate from some responsible person as to their good character.

Applicants will be received for one month on probation. During this month they are boarded and lodged at the expense of the Hospital, but receive no compensation if they leave before the expiration of the month, or are found incompetent by the lady superintendent.

The superintendent of the Hospital and lady superintendent of the nurses' school will have full power to decide as to the fitness of the nurses for the work, and the propriety of retaining or dismissing them at the end of the month for trial. The same authority can discharge them in case of misconduct or inefficiency.

They will reside in the Hospital and serve the first year as assistants in the wards of the Hospital; the second year they will be expected to perform any duty assigned them by the lady superintendent, either to act as nurses in the Hospital or to be sent to private cases among the rich or poor.

TRAINING.

Those persons complying with the foregoing conditions will be accepted as pupils by signing a written agreement to remain at the school for two years, and to conform to the rules of the Hospital.

The instruction includes:

1. The dressing of blisters, burns, sores, and wounds; the preparation and application of fomentations, poultices, and minor dressing.
2. Application of leeches, and subsequent treatment.
3. Administration of enemas.
4. Use of female catheter.
5. The best method of friction to the body and extremities.
6. Management of helpless patients, moving, changing, giving baths in bed, preventing bed-sores, and managing positions.
7. Bandaging, making bandages and rollers, and lining splints.
8. Making beds and changing sheets while the patient is in bed.
9. That no part of the Hospital is clean if it can be made cleaner.

The pupils are taught to prepare food, together with drinks and stimulants for the sick; to understand the art of ventilation without chilling the patient, both in private houses and hospital wards, and all that pertains to night, in distinction from day, nursing.

To report to the physician accurate observations of the state of the secretions, expectoration, pulse, skin, appetite, temperature of the body, intelligence (as delirium or stupor), breathing, sleeping, condition of wounds, eruptions, formation of matter, effect of diet, stimulants, or medicines, and to learn the management of convalescents.

Instruction will be given by attending and resident physicians, and surgeons at the bedside of the patients, and in various other ways, also, by the lady superintendent and head nurse.

The pupils will pass through the different wards, serving and being taught, for one year. They will be supplied with board and lodging, and will be paid ten dollars (\$10) per month the first year, the second, fourteen dollars (\$14) per month for their clothing and personal expenses. This sum, with their education, is considered a full equivalent for their services.

When the full term of two years is completed, the nurses thus trained, after passing a final examination, will receive diplomas, certifying to their knowledge of nursing, their ability, and good character.

N. B.—This paper is to be filled in (in the candidate's own handwriting), and sent to the Superintendent of the Hartford Hospital, Hartford, Conn.

QUESTIONS TO BE ANSWERED BY CANDIDATE.

1. Name in full, and present address of candidate.
2. Are you a single woman or widow ?
3. Your present occupation or employment ?
4. Age last birthday, and date and place of birth ?
5. Height ? Weight ?
6. Where educated ?
7. Are you strong and healthy, and have you always been so ?
8. Are your sight and hearing perfect ?
9. Have you any physical defects ?
10. Have you any tendency to pulmonary complaint ?
11. If a widow, have you children ? How many ? Their ages ? How are they provided for ?
12. Where (if any) was your last situation ? How long were you in it ?
13. The names in full and addresses of two persons to be referred to ? State how long each has known you. If previously employed, one of these must be the last employer.
14. Have you ever been a pupil of any other training-school ?
15. Have you read and do you clearly understand the regulations ?

I declare the above statement to be correct.

(Signed)

Candidate.

Date.

MEDICAL CASES TREATED IN
HARTFORD HOSPITAL,

FROM OCTOBER 1, 1879, TO OCTOBER 1, 1880.

	Males.	Females.		Males.	Females.
Alcoholism,	46	7	Hydatid of Liver,	1	
Angina Pectoris,	2		Heart, Palpitation,	1	
Apoplexy,	2		“ Mitral Stenosis,	2	
Addison's Disease,	1		“ Hypertrophy,	1	
Arsenic Poisoning,	1		Hysteria,		2
Bronchitis,	6	1	Incontinence of Urine,	1	
Bright's Disease, Chronic,	1	1	Inanition,	1	
“ “ Acute,	1	1	Infants,	11	8
Constipation,	3	3	Insanity,	2	3
Catarrh, Gastro-hepatic,	1		Imbecility,		1
Cirrhosis of Liver,	3		Irritable Bladder,	2	
Convulsions, Infantile,	1		Insolation,	1	
Delirium Tremens,	3		Jaundice,		1
Diarrhœa, Chronic,	3		Lightning Stroke,	1	
Dyspepsia,	5	1	Meningitis,	1	1
Debility, General,	3	6	“ Cerebral,	1	
“ Senile,	6	6	Nervous Prostration,		1
Dysentery,	3		Neuralgia, Cerebral,	1	
Emphysema,	2		Neuralgia,	1	1
Epilepsy,	4	3	Paraplegia,	1	
Endocarditis,	1		Purpura Hæmorrhagica,	1	
Fever, Continued,	3		Pneumonia,	5	1
“ Intermittent,	35	23	Pleurisy,	4	
“ Typhoid,	10	1	Paralysis Agitans,	2	1
“ Typho-malarial,	1	1	Phthisis,	25	9
“ Bilious,	2	1	Pregnancy,		31
Gastritis,	2	2	Peritonitis,		1
Gastro Duodenitis,	1		Pleurisy, Sub-acute,	1	
Hematuria,	1		Pulmonary Gangrene,	1	
Hemiplegia,	1	3	Paralysis,		1

	Males.	Females.		Males.	Females.
Progressive Locomotor Ataxia,	2		Tetanus,	1	
Rheumatism, Acute,	6	2	Urethral Congestion,	1	
“ Chronic,	19		Variola,	1	
“ Gonorrhœal,	1				
Sciatica,		1	Total,	253	129

SURGICAL CASES.

	Males.	Females.		Males.	Females.
Abscess of Face,		1	of Radius and Ulna,	1	
of Uterus,		1	Eczema,		2
of Foot,	1		Epithelioma of Foot,		1
of Back,	1		of Lip,	2	
of Palmar,		1	of Ear,	1	
of Perineal,	1		Enlarged Prostate,	2	
Anthrax,		1	Endometritis,		3
Arthritis,		1	Erysipelas,	2	1
Burns,	2		Epididymitis,	5	
Bubo,	3		Ferunculus,	1	
Cancer of Breast,		4	Fistula in Ano,	2	
of Stomach,	1		Fibroid Tumor of Uterus,		1
of Uterus,		1	Fracture of Skull,	3	
of Neck,	1		of Tibia,		2
of Liver,		1	of Fibula,	2	1
Chancroids,	1	1	of Metacarpal,	1	
Caruncula,		1	of Femur,		2
Cystitis,		3	of Humerus,	1	
Contusion of Limbs,		1	of Scapula,	2	
of Head,	1		of Tibia, and Fib. Co.,	2	
of Knee,	1		Gonorrhœa,	2	
of Back,	2		Hydrocele,	1	
of Eye Lid,	2		Hemorrhoids,	4	1
of Hip,	3		Hare Lip,		1
of Side,	1		Hernia Inguinal,	1	
of Face,	2		Incised wound of Throat,	1	
Contused wound of leg,		1	of Wrist,	1	
Caries of Tibia,	1		Injury of Hand,	1	
of Femur,	1		of Finger,	4	
Concussion of Spine,	1		of Ear,	1	
Caries of Foot,	1		Lumbago,	1	2
Dislocation of Humerus,	1		Lacerated wound of hand,	2	

	Males.	Females.		Males.	Females.
Morbus Coxarius,	2	1	Sprain of Foot,		
Necrosis of Inferior Max.,	1		Stricture of Urethra,	5	
of Pelvis,	1		Scrofula,	1	
of Thumb,		1	Syphilis, Primary,		1
Nævus,		1	“ Secondary,	3	3
Ovarian Tumor,		1	“ Tertiary,	3	
Orchitis,	2		“ Hereditary,		1
Onychia,		1	Tumor of Face,		1
Paronychia,	1		Tonsilitis,	1	1
Phlegmonous Sorethroat,	2	1	Synoritis, Chronic,	1	
Periostitis,		1	Ulceration of Cervex,		1
Phlegmonous Inflam.,		1	Ulcer, Varicose,	3	3
Prolapse Uteri,		1	“ Indolent,	15	5
Pott's Disease of Spine,		2	“ Syphilitic,	2	1
Retention of Urine,	1		Vesical Calculi,	1	
Retroversion of Uterus,		1			
Sprain of Knee,	3	1			
of Wrist,		1			
of Back,	1				
of Elbow,	1				
of Hip,		1			
			Total,	124	68

Eye and Ear Department.

	Males.	Females.		Males.	Females.
Anterior Synechia,	1		Staphyloma,	1	
Cataract,	5		Strabismus Internas,		1
Conjunctivitis,	1		Trachoma,	2	
“ Gonorrhœal,	1		Ulceration of Cornea,		1
Granula, Lids,	1	1	Perforation of Tympani,	1	
“ “ with paunus,		1	Polypus, Meatus,	1	
Glaucoma,	1	1			
Iritis, Syphilitic,	1				
Injury of Eye,	1				
Keratitis, Suppurative,	1				
Kerato-Iritis,	1				
Ophthalmia, Neantorum,	1				
			Total,	20	5

Births.

Male,	11	Female,	9
-------	----	---------	---

Table of Deaths.

Apoplexy,.....	6	Meningitis,.....	1
Acute Bright's,.....	1	Phthisis,.....	15
Addison's Disease,.....	1	Peritonitis,.....	2
Abscesses of Back,.....	1	Puerpural Peritonitis,.....	1
Cancer,.....	2	Pneumonia,.....	2
Chronic Rheumatism,.....	1	Softening of Brain,.....	2
Cerebral Meningitis,.....	1	Senile Debility,.....	3
Capillary Bronchitis,.....	2	Spinal Meningitis,.....	1
Collitis,.....	1	Shock,.....	1
Chronic Diarrhoea,.....	1	Senile Gangrene,.....	1
Cirrhosis of Liver,.....	3	Still Born,.....	3
Chronic Meningitis,.....	1	Suicide,.....	1
Congestion of Brain,.....	1	Typhoid Fever,.....	2
Endo Carditis,.....	1	Tetanus,.....	1
Exhaustion,.....	1		—
Fracture Base of Skull,...	2		
Fracture of Vertebræ,....	1	Total,.....	68
Gangrene of Lungs,.....	1		
Gastro Enteritis,.....	1		
Infantile Convulsions,....	1		

Table of Operations.

Diseases.	Males.	Females.
Amputation of Breast,.....	..	2
of Finger,.....	3	
of Hand,.....	1	
of Thigh,.....	1	
of Thumb,.....	2	
Dilatation of Urethra,.....		1
Divulsion of Urethral Stricture,.....	3	
Exsection of Head of Metatarsal bone,.....		1
For Cataract,.....	2	
Fistula in Ano,.....	1	
Hydrocele,.....	3	
Keratitis Suppurative,.....	1	
Staphyloma,.....	2	
Strabismus,.....	2	
Foreign body from Iris,.....	1	
Caruncula, Urethral,.....		1
Epithelioma of lip,.....	1	
Cancerous Gland,.....		3
Hæmorrhoids,.....	6	
Polypus, Uterine,.....		1
Removal of Tonsils,.....	1	1
Iridectomy,.....	1	
Lithotomy,.....	1	
Urethotomy,.....	1	
Total,.....	33	10

ACTS OF LEGISLATION.

Act Incorporating The Hartford Hospital.

Resolved, by the Senate and House of Representatives in General Assembly convened :

SECTION 1. That David Watkinson, Ebenezer Flower, A. S. Beckwith, S. S. Ward, A. W. Butler, A. M. Collins, Wm. T. Lee, Job Ailyn, Samuel Colt, James B. Crosby, Albert Day, Chester Adams, James G. Bolles, George Beach, Thomas Smith, Jonathan Goodwin, A. W. Birge, Lucius Barbour, and Charles T. Hillyer, and all such persons as are from time to time associated with them, for the purpose of establishing and maintaining a hospital in the city of Hartford, and their successors, be, and they hereby are, incorporated for said purpose, and made a body corporate and politic, by the name of The Hartford Hospital, and by that name shall be capable of suing and being sued, pleading and being impleaded, and may purchase, take, receive, hold, sell, and convey estate, real and personal, to such an amount as may be necessary for the purposes of said corporation ; may have a common seal, and the same may alter and change at pleasure, and may make and execute such by-laws and regulations, not contrary to the laws of this State or of the United States, as shall be deemed necessary for the well ordering and conducting the concerns of said corporation.

SEC. 2. That said corporation shall be governed by the following articles :

ARTICLE 1. This corporation shall be called The Hartford Hospital. Persons contributing for the use of the corporation at any one time the sum of fifty dollars, shall be members for life. Persons contributing the sum of five hundred dollars

shall be vice-presidents for life, and also directors for life; those contributing two hundred dollars shall be directors for life; those twenty-five dollars shall be members for five years, and those ten dollars shall be members for one year.

ART. 2. In order the better to carry into effect the object of the said corporation, the members thereof shall, at an annual meeting, to be held at such time and place as the by-laws of the said corporation shall direct and appoint, elect from their own number, by ballot, and by a majority of the votes given at such election, twelve persons as directors of the said corporation; and the persons so elected, together with the mayor of the city of Hartford for the time being, shall constitute a board of directors. The directors so elected shall hold their offices for one year, and until others are elected in their places. In case of any vacancy in the board the remainder of the directors shall have power to fill such vacancy until the next election.

ART. 3. The board of directors shall, annually, as soon as may be convenient after the said annual election, elect by ballot from among their own numbers, a president, a vice-president, and shall also elect a secretary and treasurer, who shall hold their offices for one year, and until others are elected in their stead. But as many directors may be chosen as there may be directors by subscription.

ART. 4. The said board of directors shall have power to manage and conduct all the business and concerns of the corporation, and to make such laws as may be necessary for the management and disposition of the estate and concerns of the corporation, and to appoint such officers and servants as they may deem necessary. The medical officers, including all attending and consulting physicians and surgeons, shall be appointed annually. Vacancies occurring before the expiration of a year from the time of any appointment, shall be filled by the directors as soon as the same can conveniently be done.

ART. 5. A majority of the corporators shall call the first meeting for the election of officers, at such time and place in the city of Hartford as they shall appoint, giving three days'

notice thereof by publishing the same in the daily papers of the city ; and the annual meeting of said corporation shall be held at such time and place, and on such notice as shall be fixed by the by-laws of said corporation.

SEC. 3. This act may be altered, amended, or repealed by the General Assembly.

Approved, May session, 1854.

Resolution Amending the Charter of The Hartford Hospital.

Resolved, That additional members of said corporation may hereafter be elected at any annual meeting by a two-thirds vote of those present without the payment of any sum of money on the part of members so elected.

SEC. 2. So much of the original act incorporating The Hartford Hospital as is inconsistent with this act is hereby repealed.

Approved, January session, 1881.

Amendment of the Charter of The Hartford Hospital.

Whereas, it is deemed desirable that in addition to the strict purposes of a hospital the said corporation should have the power, with such funds as shall be given for that purpose, to establish in connection with said hospital, and upon the same grounds, or elsewhere, an Old People's Home, or a department for the comfortable support and maintenance of such aged and infirm persons as shall, from time to time, be admitted to the comforts and privileges of such department by and under such rules and regulations and upon such terms as shall, from time to time, be established by said corporation—therefore

Resolved by the Senate and House of Representatives in General Assembly convened :

SEC. 1. That in addition to the powers already conferred upon The Hartford Hospital, said corporation are hereby authorized to establish, in connection with these present hospital buildings, and upon the hospital grounds, or elsewhere, an

Old People's Home, or a department or home for the accommodation, support, and maintenance of such aged and infirm persons as shall, from time to time, be admitted to the comforts and privileges of such department or home, and erect the necessary buildings therefor, and sustain the said home with such funds and means as shall be given for that purpose, or paid by or for the benefit of the persons admitted to said home. The board of directors of said Hartford Hospital shall have the power to make and execute any and all such by-laws, rules and regulations, in relation to such department or home, and the management of the same, and the funds pertaining thereto, and generally all the concerns of said department, not contrary to the laws of this State, or of the United States, as shall be deemed necessary or proper for the well ordering and conducting the concerns of said department, and the same repeal or change at pleasure. And may appoint, if deemed expedient, a board of managers for said department, with such powers as they shall deem proper, and also such officers and servants as they may deem necessary.

All the rights and privileges conferred by the charter of The Hartford Hospital upon persons contributing for the use of said corporation shall be had and enjoyed by persons and parties limiting their contributions to the use of the department for the aged and infirm, as fully and to the same extent as if no such limitation was connected with such contributions.

All the moneys and funds already or which shall be given or contributed for the uses and purposes of The Hartford Hospital shall be confined to and used for the benefit of the hospital department, and all moneys and funds in any way given or contributed for the aged and infirm department shall be held and used exclusively for that department, under such rules and regulations as may be adopted in relation to a division of the common expenses pertaining to the two departments which cannot be kept separately and accurately divided.

This department of The Hartford Hospital shall be known as The Old People's Home, and any and all moneys, gifts, legacies,

devises, bequests, or other contributions, given to The Old People's Home, or for its use, or to The Hartford Hospital, or to any other trustee or trustees, for or in trust for the use of The Old People's Home, shall be good and effectual, and shall be for the use of this department for the aged and infirm created under this act.

Approved, June 19, 1873.

Act Appropriating Money for The Hartford Hospital.

Resolved by this Assembly :

That the comptroller of public accounts be, and he hereby is, authorized and directed to draw an order upon the treasurer of this state in favor of the person who, for the time being, shall act as treasurer of The Hartford Hospital, for the sum of ten thousand dollars, whenever the treasurer of said hospital shall exhibit to said comptroller satisfactory evidence that the sum of twenty thousand dollars has been actually subscribed and paid to said hospital by private individuals, and whenever satisfactory obligations have been given to the treasurer of this state that said hospital shall, at all times, be open to receive, upon equal terms, mariners and all other persons from all parts of the state.

Approved, May session, 1855.

Act Exempting The Hartford Hospital from Taxation.

Be it enacted by the Senate and House of Representatives in General Assembly convened :

That all property, real or personal, which has been or may be granted or given to "The Hartford Hospital," and by them invested and held for the use of said institution, shall with the income thereof remain exempt from taxation: *provided*, That the property of the directors of said institution shall not be exempt from taxation.

Approved, June 25, 1856.

Vote of the town of Hartford.

"That in relation to those persons who, by reason of sickness or accident, are thrown upon the town for temporary

support during such sickness, or while they need medical aid, the selectmen be authorized to keep them at the almshouse or at The Hartford Hospital, at their discretion."

Voted, December 8, 1856.

Act Appropriating Two Thousand Dollars.

Resolved by this Assembly :

That an appropriation of two thousand dollars be made to The Hartford Hospital, to be expended under the direction of the governor and executive committee of said hospital for the support of charity patients in said hospital, and that said executive committee be directed to use said funds in such way as to give its benefits to the different towns in the state as they may from time to time make application. Said executive committee is hereby directed to report annually to the General Assembly.

Approved, June 23, 1860.

Act making an Annual Appropriation of Two Thousand Dollars.

Resolved by this Assembly :

That an annual appropriation of two thousand dollars be made to The Hartford Hospital, to be expended under the direction of the governor and executive committee of said hospital, for the support of charity patients in said hospital, and that said executive committee be directed to use said funds in such way as to give its benefits to the different towns in the state as they may, from time to time, make application.

Said executive committee is hereby directed to report annually to the General Assembly.

Approved, July 2, 1861.

An Act in addition to an Act providing for the Support of Paupers.

Be it enacted by the Senate and House of Representatives in General Assembly convened :

SECTION 1. That no child of any person, born in The Hartford Hospital or in The New Haven Hospital while the parent

or parents of such child are residing in either of said hospitals as beneficiaries thereof, shall be deemed to be settled in the town where such child is born by reason of such birth alone.

SEC. 2. All acts and parts of acts inconsistent herewith are hereby repealed.

Approved, June 25, 1863.

Act providing for the Support of Discharged Soldiers.

Resolved by this Assembly :

That whenever any discharged soldier requiring surgical attendance shall be placed as a patient in The Hartford Hospital, or in the institution of The General Hospital Society of Connecticut, the sum of three dollars per week, for the support of such patient, shall be paid from the State treasury to such hospitals, respectively, under the direction of the Governor of this State and the executive committee of said hospitals, respectively.

The said committee are hereby directed to report quarterly to the Governor, and annually to the General Assembly, the number of said patients, as aforesaid.

Approved, July 21, 1865.

Act providing for the Support of Discharged Soldiers.

Resolved by this Assembly :

SECTION 1. That whenever any discharged soldier requiring surgical attendance shall be placed as a patient in The Hartford Hospital, or in the institution of The General Hospital Society of Connecticut, instead of the sum of three dollars, heretofore allowed, the sum of six dollars per week for the support of such patient shall be paid from the State treasury to said hospitals, respectively, under the direction of the Governor of this State and the executive committee of said hospitals, respectively.

SEC. 2. That whenever any such discharged soldier shall die in either of the above hospitals, the expense of his funeral shall be paid from the State treasury.

SEC. 3. The said committee are hereby directed to report

quarterly to the Governor, and annually to the General Assembly, the number of said patients and of funerals, as aforesaid.

Approved, June 30, 1866.

Act providing for the Support of Discharged Soldiers.

Resolved by this Assembly :

SECTION 1. That whenever any officer or soldier, honorably discharged, who has served in any regiment of Connecticut troops during the late war, shall be placed as a patient in The Hartford Hospital, or in the Institution of The General Hospital Society of Connecticut, the sum of three dollars per week for the support of such patient shall be paid from the State treasury to said hospitals, respectively, under the direction of the Governor of the State and the executive committee of said hospitals, respectively.

SEC. 2. The Governor of this State is hereby appointed commissioner of said hospitals, and he may authorize the admission of such patients as are entitled to the benefit of the first section of this law to the said hospitals, during the period requiring surgical attendance.

SEC. 3. Whenever any Connecticut officer or soldier, honorably discharged, shall die in either of the above-mentioned hospitals, the State shall pay the sum of ten dollars for the expense of the funeral of said soldier.

SEC. 4. All laws inconsistent with the foregoing are hereby repealed.

Approved, July 17, 1867.

Act amending the Act approved July 17, 1867.

Resolved by this Assembly :

That the resolution passed at the May session, 1867, and approved July 17, 1867, providing for the reception as patients of discharged Connecticut soldiers in The Hartford Hospital, or in the Institution of The General Hospital Society of Connecticut, be amended in section first by striking out "three" and inserting the word "six," and also by adding

the additional words "and this resolution shall apply to the years 1867 and 1868."

Approved, July 27, 1868.

Act appropriating Twenty Thousand Dollars.

Resolved by this Assembly :

That the sum of twenty thousand dollars be, and hereby is, appropriated from the treasury of the State to The Hartford Hospital, and that the Comptroller is hereby directed to draw his order on the Treasurer for said amount, whenever the executive committee of said hospital shall officially certify that an additional sum of twenty thousand dollars shall have been subscribed for building purposes.

Approved, July 9, 1869.

Act appropriating Twenty Thousand Dollars.

Resolved by this Assembly :

That the sum of twenty thousand dollars be, and hereby is, appropriated from the treasury of the State to The Hartford Hospital, and that the Comptroller is hereby directed to draw his order on the treasurer for said amount, in favor of said hospital, when the executive committee of said hospital shall officially certify that an additional sum of eleven thousand dollars shall have been subscribed by responsible parties toward paying the debt of said hospital building purposes.

Approved, July 26, 1871.

Providing for Support of Sick and Wounded Soldiers
in Hospitals.

Resolved by this Assembly :

SECTION 1. That whenever any discharged soldier, who was credited upon the quota of this State during the war of the rebellion, and who is a resident of this State, requires surgical or medical treatment on account of wounds received in said war, or on account of sickness or disability contracted while in the service, and who is wholly or partially disabled by reason thereof, shall be placed as a patient in The Hartford

Hospital, or in the institution of The General Hospital Society of Connecticut, or in any other institution approved by the Governor, the sum of five dollars per week for the support of such patient shall be paid from the State treasury to such hospital or institution respectively, under the direction of the Governor of this State.

SEC. 2. That the Governor is hereby authorized to employ competent surgeons to examine all soldiers received in said institutions and drawing State aid under this resolution, who shall make monthly reports to the Governor concerning the same; and such surgeons shall not be connected in any manner with said institutions; and a sum not exceeding four hundred dollars is hereby appropriated annually to pay for the services of such surgeons.

SEC. 3. No soldier hereafter discharged from one hospital in this State shall thereafter receive State aid, if admitted to any other hospital or institution for surgical or medical treatment.

SEC. 4. That all resolutions and acts inconsistent with this act are hereby repealed.

Approved, March 24, 1877.

An Act in relation to Invalid Soldiers, Sailors, and Marines.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

SECTION 1. All soldiers, sailors, and marines who served in the Union army or navy in the late civil war, in the Connecticut regiments or in the navy quota from Connecticut, and received an honorable discharge therefrom, who, from disease or wounds, may need medical care and treatment, shall be entitled to receive such medical care and treatment as may be necessary, at The Hartford Hospital, or at the hospital of The General Hospital Society of Connecticut at New Haven, and the expense of such medical care and treatment shall be defrayed by the State.

SEC. 2. All soldiers and sailors and marines who served in the Union army or navy, in the late civil war, in Connecti

cut regiments or in the navy quota from Connecticut, who shall, from wounds or disease, become unable to earn a livelihood, and who have no adequate means of support, shall, if they have received an honorable discharge from said army or navy, be entitled to a home at the hospitals named in the preceding section, and to such food and clothing as shall be necessary, and the expense thereof shall be defrayed by the State.

SEC. 3. All soldiers, sailors, and marines who served in the Union army or navy, in the late civil war, and who may wish to avail themselves of the benefits of this act, shall make application to the Governor of the State, who, with the Adjutant-General and Surgeon-General of the State, shall constitute a soldiers' hospital board, with full power to make all necessary rules and regulations for the government of soldiers and sailors and marines who may avail themselves of the benefits of this act, and shall have the sole power to admit and discharge any soldier, sailor, or marine for cause, and to fix the sum paid for such medical treatment, care, and support.

SEC. 4. All acts or parts of acts inconsistent herewith are hereby repealed, and this act shall take effect July 1, 1878.

Approved, March 27, 1878.

An Act in Amendment of an Act Concerning Public Charitable and Reformatory Institutions.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

That section eighteen of chapter five, title eight, of the Revised Statutes, be and the same is amended so as to read as follows: Five thousand dollars shall be annually paid from the treasury to The General Hospital Society of Connecticut, and the same sum to The Hartford Hospital, to be expended under the direction of the Governor and the managers of said institutions respectively, for the support of charity patients, and so used as to benefit the different towns, as they may from time to time make application; a report of which expenditures shall be made annually to the General Assembly.

Approved, March 27, 1878.

SUPERINTENDENT'S REPORT.

To the Corporation of The Hartford Hospital at their annual meeting, December 8, 1880 :

I respectfully submit the twenty-fifth annual report, for the fiscal year ending September 30, 1880, of the management of The Hartford Hospital, with the receipts, disbursements, and items of information.

The number of patients remaining in the hospital October 1, 1879, was 95 — 63 males, 32 females ; during the year 597 have been admitted, making an aggregate of 692 patients under treatment — 462 males, 230 females ; of this number 362 have recovered, 93 removed improved, 38 not improved, 30 eloped or expelled, 66 have died, and 103 remain under treatment—57 males, 46 females.

There have been 20 births — 11 males, 9 females.

The whole number of weeks occupied was 4,970 $\frac{1}{2}$, of which citizens occupied 4,201 $\frac{1}{4}$, Conn. soldiers 713, seamen 56 $\frac{2}{7}$.

There have been 59 patients, occupying 193 weeks, supported entirely by charity.

The appropriation from the State of \$5,000 has partially supported 576 patients, at the rate of \$1.21 per week for each patient.

The number of Connecticut soldiers was 42.

The number of marine patients was 19.

The daily average of patients for the year was 95 $\frac{1}{4}$.

The greatest number any one day was 109, the least 78.

The average duration of patients 7 $\frac{1}{2}$ weeks.

The average cost per week of each patient was \$6.01.

There were 311 Americans, 286 foreigners.

Patients were received from 49 different towns in the State.

The training-school for nurses is proved a success. The demand for nurses from private families from all parts of the State, and even out of the State, is constant, and ex-

ceeds our ability to supply them. Arrangements are now being made whereby we shall shortly be able to increase the number of pupil nurses under training. At the beginning of the fiscal year there were thirteen nurses under training. Of these, three have graduated, three have left for various causes, and seven remain. During the current year, twenty-four applications for positions as pupil nurses have been received. Of these ten have been taken for the probation month, six of these, having proved satisfactory, have been accepted as pupil nurses, and are now members of the school, making thirteen nurses under training in the wards. The names of the three who have graduated and received their diplomas, signed by the consulting physicians and executive committee, are Miss Ida F. Barnes, Miss Lizzie T. Oliver, and Miss Mary E. Crane.

SUPERINTENDENT'S ACCOUNT.

The HARTFORD HOSPITAL in account with LEANDER HALL.

DR.			CR.
1879-80. To am't paid for		1880. By am't received,	
Breadstuffs,	\$1,011.02	F. A. Brown,	\$8,724.33
Barn Expenses,	288.97	W. W. Jacobs,	21,149.55
Butter and Eggs,	1,801.81	Board of Patients from va-	
Books,	33.75	rious towns,	9,261.48
Clothing,	25.95	Paying Patients,	4,423.79
Fuel,	2,725.83	U. S. Collector, Board of	
Furniture,	747.04	Seamen,	436.00
Fruit and Vegetables,	934.73	Rent,	857.77
Freights,	25.28	Services of Nurses,	1,083.69
Groceries,	1,294.05	Sales,	34.40
Gas,	853.59	Registrar of Births and Deaths,	21.50
Improvements,	1,209.70		
Insurance,	50.00		
Ice,	145.00		
Meat, Fish, and Fowl,	5,105.09		
Milk,	904.08		
Medicine,	1,080.98		
Miscellaneous,	109.52		
Printing, Stationery, etc.,	303.13		
Salaries, Wages, and Labor,	10,282.70		
Washing and Soap,	158.39		
Water,	296.00		
Whiskey, Wine, etc.,	304.26		
Instruments,	32.97		
Taxes,	180.04		
Total Current Expenses,	\$29,873.88		
Am't paid Treasurer, Board of Patients, etc.,	16,118.63		
	<hr/> \$45,992.51		<hr/> \$45,992.51

*Detailed Statement of the Receipts of the HARTFORD HOSPITAL from
Oct. 1, 1879 to Oct. 1, 1880.*

Received from the State Appropriation :

December 31, 1879,	-	-	-	\$1,250.00
March 31, 1880,	-	-	-	1,250.00
June 30, 1880,	-	-	-	1,250.00
Sept. 30, 1880,	-	-	-	1,250.00
				<hr/>
				\$5,000.00

Received from the State for Board of Soldiers :

December 31, 1879,	-	-	-	\$729.99
March 31, 1880,	-	-	-	852.40
June 30, 1880,	-	-	-	818.92
Sept. 30, 1880,	-	-	-	809.89
				<hr/>
				\$3,211.20

Received from the U. S. Collector for Seamen :

December 31, 1879,	-	-	-	\$41.00
March 31, 1880,	-	-	-	137.00
June 30, 1880,	-	-	-	45.00
Sept. 30, 1880,	-	-	-	213.00
				<hr/>
				\$436.00

Received from various town in the State :

December 31, 1879,	-	-	-	\$2,617.24
March 31, 1880,	-	-	-	2,391.19
June 30, 1880,	-	-	-	1,969.78
Sept. 30, 1880,	-	-	-	2,283.27
				<hr/>
				\$9,261.48

Received from Paying Patients :

December 31, 1879,	-	-	-	\$1,278.88
March 30, 1880,	-	-	-	897.88
June 30, 1880,	-	-	-	910.11
Sept. 30, 1880,	-	-	-	1,336.92
				<hr/>
				\$4,423.79

Received from Sales :

December 31, 1879,	-	-	-	7.65
March 30, 1880,	-	-	-	3.30
June 30, 1880,	-	-	-	8.45
Sept. 30, 1880,	-	-	-	15.00
				<hr/>
				\$34.40

Received from Rent :

December 31, 1879,	-	-	-	\$255.25
March 31, 1880,	-	-	-	188.25
June 30, 1880,	-	-	-	206.76
Sept. 30, 1880,	-	-	-	207.51

\$857.77

Received from Registrar of Births and Deaths,				21.50
Received from income of fund,	-	-	-	12,723.86
Total Receipts,	-	-	-	35,968.00

Received from Services of Nurses, - - - \$1,683.69

Number of Patients who have received the benefits of the Hospital during the year ending September 30, 1880.

	Male.	Female.	Total.
Number of patients in Hospital, October 1, 1879,	63	32	95
Admitted during the year,	399	198	597
Total,	462	230	692
Of this number have been discharged :			
Recovered,	252	110	362
Improved,	57	36	93
Not improved,	23	15	38
Removed, discharged, or eloped,	23	7	30
Dead,	50	16	66
Total,	405	184	589
Remaining October 1, 1880,	57	46	103
Whole number admitted to October 1, 1880,			7,116
“ “ discharged to October 1, 1880,			7,063
“ “ remaining October 1, 1880,			103

Monthly Admissions from October 1, 1879, to September 30, 1880.

	Male.	Female.	Total.		Male.	Female.	Total.
October,	30	25	55	May,	34	15	49
November,	36	12	48	June,	36	18	54
December,	32	10	42	July,	40	26	66
January,	30	18	48	August,	35	16	51
February,	28	11	39	September,	43	26	69
March,	30	6	36				
April,	25	15	40	Total.	399	198	597

Occupation of Patients.

Boot-makers,	7	Farmers,	25	Physicians,	2
Brass-molders,	6	Factory Op'tives,	11	Paper-makers,	2
Brewers,	3	Fireman,	1	Painters,	10
Butchers,	3	Gunsmiths,	2	Prostitutes,	3
Box-makers,	2	Gardeners,	5	Plumbers,	2
Blacksmiths,	4	Housekeepers,	63	Printers,	4
Barbers,	3	Hostlers,	13	Peddlers,	7
Broom-maker,	1	Harness-makers,	6	Pattern-makers,	2
Burnishers,	2	Hatters,	2	Quarryman,	1
Brakeman,	1	Helpers,	2	Reporters,	4
Bookbinder,	1	Infants,	22	Roofers,	6
Baker,	1	Jewelers,	5	Seamen,	21
Clerks,	11	Laborers,	111	Saloon-keepers,	9
Cooks,	9	Laundresses,	7	Sextons,	2
Carpenters,	7	Missionary,	1	Students,	3
Clergyman,	1	Masons,	5	Teacher,	1
Cabinet-makers,	3	Mechanics,	2	Tinsmiths,	3
Cigar-makers,	3	Merchants,	8	Teamsters,	12
Domestics,	77	Machinists,	14	Tailors,	6
Dressmakers,	4	Nurses,	3	Waiters,	13
Dentist,	1	None,	23	Weaver,	1
Engineers,	2				

Nativity of Patients.

Alabama,	1	Ireland,	182	New Hampshire,	3
Connecticut,	202	Italy,	2	Ohio,	1
Canada,	6	Illinois,	1	Pennsylvania,	5
Denmark,	2	Louisiana,	3	Portugal,	1
Dist. of Columbia,	1	Massachusetts,	27	Russia,	1
England,	28	Maine,	4	Rhode Island,	5
East Indies,	1	Maryland,	1	Sweden,	10
France,	4	Michigan,	1	Scotland,	4
Florida,	1	New York,	28	Switzerland,	1
Germany,	23	North Carolina,	2	Vermont,	5
Georgia,	2	New Jersey,	2	Virginia,	3

Patients were received from the following towns.

Avon,	Manchester,	Plainville,
Bristol,	Mansfield,	Simsbury,
Canton,	Meriden,	South Windsor,
Coventry,	Madison,	Stonington,
Bloomfield,	Norwich,	Suffield,
East Windsor,	North Canaan,	Salisbury,
Essex,	New London,	Torrington,
Enfield,	New Haven,	Vernon,
East Hartford,	New Britain,	Watertown,
Farmington,	New Hartford,	Windsor Locks.
Glastonbury,	Naugatuck,	Wethersfield,
Hartford,	Newington,	Windsor,
Haddam,	Portland,	West Hartford,
Lyne,	Plymouth,	Waterbury.
Middletown,		.

GENERAL STATISTICS.

YEARS.	Admitted during the year.	NUMBER EACH YEAR.						Remaining at the end of the year.	Daily Average for the year.	NUMBER ANY DAY.	
		Under Care.	Discharged.	Recovered.	Improved.	Not Improved.	Dead.			Greatest.	Least.
1860-1861,	45	45	32	21	7	1	3	13	12	14	1
1861-1862,	258	271	214	159	20	12	23	57	27	85	14
1862-1863,	107	164	141	103	15	5	18	23	18	57	11
1863-1864,	157	180	149	103	14	8	24	31	27	45	21
1864-1865,	132	163	142	102	2	9	29	21	27	31	21
1865-1866,	196	217	172	133	5	8	26	45	35	49	21
1866-1867,	221	266	211	176	8	5	24	55	44	59	29
1867-1868,	251	306	250	183	16	15	36	56	50	63	38
1868-1869,	259	315	260	192	18	16	34	55	55	67	42
1869-1870,	248	339	293	220	21	20	37	41	50	62	36
1870-1871,	329	370	306	210	28	18	50	64	63	67	39
1871-1872,	347	411	345	215	43	46	41	66	62	71	59
1872-1873,	370	436	368	206	76	31	55	68	69	76	56
1873-1874,	452	520	422	299	36	29	58	98	79	98	63
1874-1875,	492	590	486	323	53	29	53	104	95	119	71
1875-1876,	603	707	573	376	64	35	57	134	113	136	90
1876-1877,	599	733	613	378	85	49	72	120	130	149	112
1877-1878,	914	1,034	944	591	117	66	100	90	101	122	80
1878-1879,	538	628	533	307	93	37	68	95	97	113	87
1879-1880,	597	692	589	362	93	38	66	103	94	109	78
	7,115		7,048	4,659	812	475	874				

DONATIONS.

Through the kindness of the editors we have received the Hartford Courant, Hartford Post, Hartford Times, Meriden Call and Citizen, and The Churchman.

Magazines, Papers, and Periodicals.

Mrs. Tuller, bdl. magazines ; Mrs. Pliny Jewell, Jr., newspapers and magazines ; Mrs. D. B. Mosely, newspapers ; Mrs. E. K. Hunt, bdl. newspapers ; George W. Root, bdl. newspapers ; Mrs. J. W. Bracc, magazines and newspapers ; Mr. Crossett, newspapers ; Mrs. Henry Very, newspapers ; Lewis Sheldon, 2 vols. Zell's Encyclopedia, magazines and newspapers ; Mrs. M. M. Woodbury, bdl. newspapers ; Mrs. S. C. Robbins, bdl. newspapers ; Mr. Phelps, bdl. illustrated newspapers ; Mr. Churchill, bdl. magazines ; C. T. Marston, newspapers ; Mrs. Tolhurst, newspapers ; Mrs. C. B. Smith, newspapers ; E. B. Watkinson, illustrated newspapers.

Fruits and Flowers.

Dr. E. K. Hunt, bushel of pears ; Mrs. Stiles D. Sperry, basket of oranges ; Mrs. Barnard, 5 bushels of apples ; G. W. Darlin, 1 bbl. apples ; Mrs. Colt, 2 bushels apples ; Mrs. Burdette Loomis, flowers ; Mrs. Seymour, flowers ; Rev. E. P. Parker, cross of flowers ; Mrs. Marston, flowers ; the Flower Mission through Mrs. Sluyter, flowers weekly.

Clothing, Old Linen, and Cotton.

Miss Bull, old cotton ; Miss A. C. Hills, bdl. old shirts ; Mrs. Amos Pillsbury, bdl. old shirts ; Mrs. L. T. Welles, bdl. under-clothing ; George W. Corning, 23 shirts, 8 night-shirts, 10 night-dresses, 5 chemises, 2 pair drawers, 1 wrapper, 1

vest, bdl. under-clothing, 2 bdls. old cotton; Mrs. Pliny Jewell, 1 shawl, stockings and shirts; Mr. C. J. Fuller, bdl. old shirts; Mrs. J. F. Smith, Unionville, Conn., bdl. shirts and under-clothing; Mrs. George Hatch, bdl. shirts and old cotton; Mrs. Roland Swift, bdl. old shirts; Mrs. D. B. Mosely, bdl. old cotton; Mrs. Oswin Welles, bdl. under-clothing; Mrs. J. P. Harbison, bdl. clothing, bdl. old cotton; Miss Hull, 2 pair drawers; Mrs. George Roberts, bdl. old linen. The family of Erastus Collins, 8 shirts, 8 pairs socks, 5 dusters, 2 dressing-gowns, 1 coat, old cotton, hats, shoes, rubbers, gloves, collars, etc.

Thanksgiving and Christmas.

Mrs. C. H. Brainard, 2 boxes figs, 12 dozen oranges, 2 bushels apples, 8 lbs. Malaga grapes; Mrs. Shipman, 27 oranges, Malaga grapes and apples; Hon. Dwight Pardee, \$10 00 and basket of fruit; Mrs. A. S. Porter, 50 oranges; Mrs. E. K. Hunt, box oranges.

Some names may be unintentionally omitted. Many have left donations without leaving their names, but all are assured their gifts have been thankfully received.

BY-LAWS

OF THE

CORPORATION

AND RULES

OF THE

HARTFORD HOSPITAL.

BY-LAWS OF THE CORPORATION.

I. ANNUAL MEETINGS.

The annual meetings of The Hartford Hospital shall be held on the second Monday of December, in the city of Hartford, at such time and place as the executive committee shall appoint, by giving three days' notice in the daily papers.

II. DIRECTORS' MEETINGS.

1. The directors shall hold their annual meeting on the third Monday of December. Notice of the time and place shall be given to each member by the secretary.

2. Five of the directors shall constitute a quorum.

3. The president, or in his absence the vice-president, shall, at the request of not less than three members of the corporation, call meetings of the directors, and notice of the time and place shall be given to each member by the secretary.

4. The directors, at their first or adjourned meeting after election, shall select from their own number three persons, who shall act as an executive committee; also, elect six or more physicians and surgeons to take charge of the medical and surgical departments; said physicians and surgeons having been first nominated by the visiting medical and surgical staff.

III. EXECUTIVE COMMITTEE.

1. The executive committee shall appoint a superintendent of the hospital, oversee the finances, admit and discharge patients, and see that they are provided with such things as are necessary for their comfort and recovery.

2. It shall be their duty to direct the management in all the affairs of the institution.

3. All orders on the treasurer must be signed by one of the executive committee.

4. A meeting of the executive committee shall be held at the hospital at least twice during each month, and a record of their doings shall be kept by the superintendent.

IV. VISITING PHYSICIANS AND SURGEONS.

1. The visiting physicians and surgeons shall take charge of the medical and surgical departments, and arrange their turns for visiting the hospital.

2. Acute cases must be visited every day, and chronic cases as often as necessity requires.

V. SUPERINTENDENT.

1. The superintendent shall take charge of the hospital, under the direction of the executive committee.

2. All moneys for board of patients must be paid to the superintendent, unless otherwise directed by the executive committee.

VI. PATIENTS.

Patients may be admitted by either member of the executive committee, subject to the approval of said committee, at their regular hospital meetings.

VII. COMPENSATION.

Neither the medical staff nor executive committee shall receive from the hospital compensation in any form for duties performed in its behalf.

VIII. AMENDMENTS.

No by-law shall be altered or amended, except by a two-thirds vote of the directors present at an annual meeting—such amendment having first been presented to the board of directors, in writing, at a previous annual meeting.

RULES OF THE HARTFORD HOSPITAL.

I. VISITING PHYSICIANS AND SURGEONS.

1. The visiting physicians and surgeons shall have the entire direction of the medical and surgical department. They shall also exercise a supervision of the condition of the wards, the department of the nurses, and prescribe the diet for patients. They shall give such directions to the superintendent as shall be necessary in regard to the health and physical condition of the patients, and see that these directions are carefully executed, and their prescriptions faithfully administered.

They shall report to the executive committee whatever interferes with the welfare of the institution.

2. The regular visits of the visiting physicians and surgeons shall be made daily, between the hours of 8 A. M. and 12 M.

3. Extra visits shall be made whenever the necessity of the case demands.

4. They shall report to the superintendent patients who are in a proper condition to be discharged from the Hospital.

5. No visiting physician or surgeon shall absent himself from duty without notifying some member of the executive committee.

6. All surgical operations shall be performed by the visiting surgeon in attendance, or some member of the staff, by his invitation.

7. No capital operation shall be performed without consultation with the medical staff.

8. Notice of the time for operating shall be sent by the superintendent to all members of the staff.

9. No operation shall be performed without the consent of the patient; but if consent cannot be obtained after all the

surgeons in consultation have decided that the patient's safety demands it, the visiting surgeon shall advise the discharge of the patient from the Hospital.

II. RESIDENT AND ASSISTANT SURGICAL MEDICAL STAFF.

1. The resident and assistant medical and surgical staff shall consist of two or more physicians and surgeons who are graduates from a medical college.

2. Each of the house-staff shall sign an agreement to remain in the service of the Hospital for one year, and conform to its rules and regulations.

3. Each shall serve the first six months as assistant, and the remainder of the term as resident physician and surgeon.

4. They shall not be absent at the appointed hours for the attendance of the visiting physicians and surgeons, and when desiring to leave the premises they shall arrange with the superintendent for their absence.

5. Under no circumstances shall all members of the house-staff be absent at the same time.

III. RESIDENT PHYSICIAN AND SURGEON.

1. The duties of the resident physician and surgeon shall be assigned him by the visiting physicians and surgeons, all of whose instructions and directions in regard to the care and treatment of the sick he must promptly and carefully execute.

2. He shall visit the patients in their respective wards every morning and evening, and be prepared to report their condition to the visiting physicians and surgeons.

3. He shall accompany the physicians and surgeons in their daily visits, shall, under their directions, record each case, stating name, age, and disease, with symptoms, treatment, and result, record daily all prescriptions, and note all important facts.

4. He shall, under the direction of the physicians and surgeons, make a report to the corporation of all the diseases and the results of those cases which have been treated in the Hospital during the fiscal year ending the last day of September.

5. He shall send the diet-list prescribed for the day to the lady superintendent, who will have the food prepared and sent to the wards.

6. He shall see that the medicines are correctly compounded and faithfully administered, the diets properly furnished, and the patients kindly treated by the attendants.

7. The resident physician must report to the lady superintendent any improper conduct on the part of nurses or patients, but shall not, under any circumstances, attempt to discipline them.

8. In any case of emergency he shall request the immediate attendance of the visiting physician or surgeon; if he cannot be found, any member of the visiting staff shall be called.

9. He shall record the name of the attending physician and surgeon; the day of the week, the date, and time of day when each visit is made. This record must be made immediately after each visit.

IV. ASSISTANT PHYSICIAN.

The assistant physician shall attend the resident physician and surgeon in his morning visits to the patients, and shall be present at the regular visits of the attending physicians and surgeons, and shall perform such duties as may be assigned him by the executive committee, with the advice of the visiting physicians and surgeons.

V. APOTHECARY.

1. The apothecary shall compound and dispense all medicines prescribed, agreeably to the formulas from time to time directed by the physicians and surgeons.

2. He shall not deliver medicines or other articles for use in the Hospital unless they have been ordered in writing on the ward book by the physicians or surgeons, and entered upon the prescription book.

3. No medicines are to be delivered to any person living out of the Hospital, except under the direction of the executive committee.

4. He shall dispense the medicines for each ward separately, and attach to each a label bearing the name of the patient for

whom prescribed, with directions for using the same, and shall send them to each ward to be distributed by the nurses.

5. He shall keep spirits, bandages, cloth, etc., in such quantities as directed by the visiting physicians and surgeons.

VI. SUPERINTENDENT.

1. The superintendent is appointed by the executive committee. He is executive officer of the board, and responsible to them for the good order of the house. He is to see that their regulations and directions are carried out, and for that purpose shall have general control of all departments of the Hospital.

2. He shall have charge of the subordinate officers, patients, grounds, buildings, and appurtenances, and shall hire and discharge all employés.

3. He shall daily visit and inspect the wards, kitchen, laundry, engine-room, &c., and all other departments as often as may be necessary, and shall give such directions and make such regulations as will be for the best interest of the institution.

4. He shall pay all bills of the Hospital, purchase all supplies and medicines, have the charge thereof, and be responsible for their proper and economical use.

5. He shall receive all moneys due the Hospital for board of patients, &c., and deposit the same with the treasurer of the corporation, and obtain drafts upon him from the executive committee, for such sums as may, from time to time, be required for the support of the institution.

6. He shall keep regular accounts of all moneys received and disbursed on account of the Hospital, with a record of all contracts, &c., and submit the same to the executive committee at their special or quarterly meetings to be audited.

7. He shall keep, for the inspection of the executive committee, a record of the names of all patients, with their age, disease, residence, employment, date of admission, discharge, elopement, or death, and the result of treatment, with such other particulars regarding each as may be desired.

8. He shall make a statement of admissions, discharges, births, deaths, number of patients under treatment, and num-

ber of persons residing in the house, and report the same, with such other information as may be of interest, at each regular meeting of the executive committee.

9. He shall, at this meeting, report the condition of all patients who in his opinion, or in the opinion of the visiting physician or surgeon, are improper subjects for hospital accommodation, also such as, in his or their opinion, do not require hospital treatment.

10. Patients shall be discharged by the superintendent under the direction of the executive committee.

11. He shall assign to each patient, upon admission, the particular bed he is to occupy, subject to the approval of the visiting physician or surgeon, and shall cause his name and date of entrance to be attached to his bed.

12. No patient shall be removed from one bed to another without first consulting the superintendent, or the attending physician and surgeon.

13. He shall suffer no patient to leave the grounds without his permission.

14. He shall keep an inventory of all furniture, and other property belonging to the Hospital, and make an annual report of the same, noting such articles as are destroyed or missing.

15. He shall return to the city registrar the births and deaths, and in case of the death of any patient shall notify the family or friends, and cause the body to be prepared for burial.

16. No body shall be removed or interred until twenty-four hours after death, except at the request of the relatives.

17. He shall report to the executive committee if the deceased left any clothing or articles of value.

18. He shall make a report to the corporation, for each year ending the last day of September, containing an account of the receipts and disbursements, number of patients in the Hospital during the fiscal year, together with such information as may be deemed proper.

VII. MATRON.

1. The matron shall have the general direction of the female servants, and see that they faithfully perform their duties.

2. She will be responsible for the neatness and order of every part of the establishment outside of the wards; superintend the kitchen and laundry, and cause an account to be kept of bedding, table, and other furniture.

VIII. LADY SUPERINTENDENT.

1. The lady superintendent shall have general management of the wards, both male and female, and is responsible for their neatness, good order, and strict discipline.

2. It is her duty to see that patients are provided with every means necessary for their recovery, and that nurses are faithful in the performance of their duties.

3. She is subject to the advice and counsel of the superintendent, medical and surgical staff.

IX. NURSES.

1. It shall be the duty of the nurses to give undivided attention to the sick, and to report immediately to the lady superintendent any neglect on the part of patients to conform to the rules prescribed for their government.

2. They shall not attempt to coerce or discipline any patient, but shall treat them with kindness and attention.

3. They shall not absent themselves from the Hospital without permission from the lady superintendent, and must report to her on their return.

X. VISITORS.

1. Visitors are welcome to the Hospital every week-day, between the hours of 2 and 5 P. M., and on Sunday for the purpose of attending divine worship, but on that day they must leave the wards when the services are ended.

2. Visitors shall not enter the wards without the consent of the superintendent or matron.

3. Visitors must deposit with the superintendent or matron any articles of food or delicacies intended for patients, which articles will be distributed as requested if not inconsistent with the condition of said patient.

XI. GOVERNMENT OF PATIENTS.

1. Patients, upon admission to the Hospital, shall deposit money and valuables with the superintendent, who will, if desired, give receipts therefor.

2. Patients shall not leave the premises without permission from the superintendent, and they shall report to him, on their return.

3. Patients shall not enter the kitchen, cellar, yard, or any of the domestics' apartments, unless by direction of the superintendent or matron.

4. No ardent spirits, or other stimulating drinks, shall be brought into the Hospital by the patients or their friends—neither shall patients be furnished fruit, or any article of food, without the knowledge and permission of the superintendent.

5. There shall be no loud talking, or profane or vulgar language, and no unnecessary noise or disturbance in the building or on the grounds.

6. Spitting on the floor, or other practices inconsistent with neatness, must be avoided, and a proper regard must be observed for cleanliness.

7. No patient shall smoke tobacco in the Hospital.

8. Before lying on their beds, patients must take off their boots and shoes, turn down the outer spread, and each patient will be responsible for the neatness of his bed when not occupied during the day.

9. All convalescents who are able shall assist in their respective wards, when requested by the nurses.

10. The patients shall be in their respective places during the visits of the attending physician and surgeon.

11. Patients shall retire at or before nine o'clock, P. M.

12. It shall be the duty of the lady superintendent to enjoin

a strict observance of the above regulations, and she shall report to the superintendent any patient who shall continue to violate the above rules, and if occasion requires, he may immediately discharge such patient from the institution.

13. No officer or employee of this institution shall accept any gift or bequest from any patient, except with the approbation of the executive committee.

XII. ADMISSION OF PATIENTS TO THE HARTFORD HOSPITAL.

1. All patients are admitted by permits from one of the executive committee, who arrange the price per week, according to the circumstances of the case and accommodations required.

2. All permits are subject to the approval of the executive committee, at their regular Hospital meeting.

3. Those who are able to contribute toward their support are received at an agreed rate.

4. The ordinary charge per week is \$6.00, which includes medical and surgical care, together with medicine and nursing.

5. Persons who are desirous of extra accommodations are charged according to circumstances.

6. Persons who are destitute of friends and means are provided for in various ways.

7. Those persons only who are carried directly from the place of accident are admitted without a certificate from the executive committee.

8. No persons having venereal or contagious diseases are admitted into this institution.

HARTFORD, CONN.,

18 ..

Upon the admission of _____ of _____ into the
 "HARTFORD HOSPITAL," at Hartford, I engage to provide or
 pay for a sufficiency of clothing for _____ use, and pay the
 treasurer of said institution _____ dollars per week for board,
 medicine, and medical attendance; cause said patient to be
 removed, when discharged, and, in the event of death, to pay
 the expenses of burial.

Principal.

For value received, I hereby engage to become responsible
 for the fulfillment of the above stipulations.

Surety.

FORM OF BEQUEST TO THE HARTFORD HOSPITAL.

ITEM. I give and bequeath to THE HARTFORD HOSPITAL, in
 the city of Hartford, the sum of _____ dollars, to be paid by
 my executors out of my real or personal estate, as soon as
 the settlement of my affairs will permit, to the treasurer of
 the said institution for the time being, in trust, to be applied
 by the directors thereof to the humane purposes of said
 institution.

FORM OF BEQUEST TO THE OLD PEOPLE'S HOME.

ITEM. I give and bequeath to THE HARTFORD HOSPITAL, in
 the city of Hartford, the sum of _____ dollars, to be paid by
 my executors out of my real or personal estate, as soon as
 the settlement of my affairs will permit, to the treasurer of
 the said institution for the time being, in trust, to be applied
 by the directors thereof to the humane purposes of the de-
 partment in said institution known and designated as The
 Old People's Home.

DONATIONS BY WILL FOR ALL SUMS LESS THAN \$5,000.

[For sums exceeding \$5,000, see tablet at the Hospital.]

Miles A. Tuttle, 1831, - - -	\$1,000	Matilda S. Adams, 1863, - -	\$500
Augustus Utley, 1852, - - -	1,000	Oswin Welles, 1877, - - -	1,000
Charles F. Pond, 1845, - - -	2,000	William J. Babcock, 1878, -	3,000
John Grou, 1867, - - -	500	Rev. Jonathan Brace, 1878, -	1,000
Mrs. Francis Parsons, 1857, -	1,000	Chas. Shipman, July 6, 1880,	460

ORIGINAL SUBSCRIPTIONS FOR BUILDING PURPOSES PREVIOUS TO 1867.

*Adams, F. D. - - -	50	Blanchard, Homer - - -	\$100
Allyn, T. M. - - -	200	Brinley, Misses - - -	100
*Alden, H. - - -	100	*Birge, A. W. - - -	60
*Andrus & Son, - - -	50	*Burnham, George - - -	60
*Ashmead & Hurlburt, - -	60	Brown, H. L. - - -	50
*Allen, Olcut - - -	60	Benson, Joseph - - -	50
*Allen, Joshua - - -	50	Ballou, L. - - -	50
Boswell, Charles - - -	500	*Brace, Thomas K., Jr. - -	50
Brown, J. Seymour - - -	500	Burr, A. E. - - -	60
Brainard, C. H. - - -	310	Brainard, Leverett - - -	50
*Benton, Charles - - -	200	Brabson & MacGower, - -	50
Bissell, Hiram - - -	200	Ballerstein, Moses - - -	50
Batterson, J. G. - - -	200	Bamberger, Leopold - - -	50
*Bulkeley, E. A. - - -	210	Boum, Jacob - - -	50
*Brace, Thomas K. - - -	210	Barrows, A. W. - - -	50
Bartholomew, G. M. - - -	260	*Beresford, Samuel B. - -	50
*Barbour, Lucius - - -	210	Beach, C. M. - - -	60
Beach, George, Jr. - - -	210	Beach, J. W. - - -	60
*Birch & Bradley, - - -	200	Bassett, E. J. - - -	50
Bartholomew, James - - -	100	*Beach, John - - -	60
Butler, John A. - - -	100	*Brown, Roswell - - -	50
*Boum, S. - - -	100	*Brown, F. A. - - -	60
Barnard, Henry 2d - - -	100	Buck, George - - -	50
*Buck, Dudley - - -	110	Buell, Robert - - -	50
*Bolles, James G. - - -	110	*Barnard, John - - -	50
*Blodgett, Roswell - - -	100	Brinley, Edward H. - - -	50
Bidwell, Pitkin & Co., - -	100	Brooks, David S. & Co. - -	25
Brainard, Hannah - - -	100	*Beach, George - - -	10

*Burkett, Ralph	-	-	\$10	Fenn, Edward H.	-	-	\$50
Bolles, Edward	-	-	10	Francis & Gridley,*	-	-	50
Bolter, James	-	-	10	Fitch, Patten	-	-	50
*Bull, John W.	-	-	10	*Fox, Gerson	-	-	50
Belknap, Thomas	-	-	10	*Farwell, John I.	-	-	50
Case, Tiffany & Co.,	-	-	310	*Farwell, T. B.	-	-	50
*Colt, Elisha	-	-	210	Fox, Charles E.	-	-	10
*Carter, Newton	-	-	200	*Goodridge, S. W.	-	-	200
*Collins, William L.	-	-	210	*Goodwin, James	-	-	210
*Colt, Samuel	-	-	1,000	Gillett, Ralph	-	-	100
*Collins, Erastus	-	-	210	Goodwin & Co.,	-	-	100
Collins, Charles	-	-	210	Gleason & Willard,	-	-	100
*Crosby, Daniel P.	-	-	200	Glazier, Carlos	-	-	50
Cheney Brothers,	-	-	300	Goldsmith, Herman	-	-	50
Catlin, Julius	-	-	210	Goodwin, Kenney & Co.,	-	-	50
Carter, H. Kendall	-	-	200	Green, William H.	-	-	50
*Church, Leonard	-	-	200	*Geer & Pond,	-	-	50
*Collins, A. M.	-	-	110	*Green, B. W.	-	-	60
Coit, Samuel	-	-	100	*Goodwin, John H.	-	-	250
*Church, Joseph	-	-	100	*Goodwin, Daniel	-	-	60
*Cook, Moses	-	-	100	*Goodwin, Jonathan	-	-	35
Crary, David	-	-	50	Goodman, C. H.	-	-	10
*Carrier, William B.	-	-	50	Gill, Alfred	-	-	10
Cellar, Mark	-	-	50	Geer, Elihu	-	-	10
Corning, George W.	-	-	60	*Hosmer, James B.	-	-	560
Corning, John B.	-	-	50	*Howe, E. G.	-	-	200
*Crosby, James B.	-	-	50	*Hills, Isaac	-	-	210
*Cook, Aaron	-	-	50	*Huntington, Hezekiah	-	-	210
Chamberlin, W. P.	-	-	50	*Hungerford & Cone,	-	-	200
*Chapin, M. W.	-	-	60	Hollister, Nelson	-	-	200
Cohen, B. M.	-	-	50	Hughes, Rev. James	-	-	200
Clark, George 3d	-	-	50	*Hudson, B. & W.	-	-	100
*Callender, W. H. D.	-	-	50	*Hills, J. & O.	-	-	160
*Chauncy, Michael	-	-	50	Hunt, Dr. E. K.	-	-	50
Crittenden, L. S.	-	-	25	Hawley, Dr. G. B.	-	-	250
*Clark, Ezra	-	-	10	*Holmes, Henry	-	-	50
Clark, Ezra, Jr.	-	-	10	Hardenburg, C. M.	-	-	50
*Dunham, Austin	-	-	210	*Hosmer, Charles	-	-	60
Daniels, Leonard	-	-	250	Hart, S. N.	-	-	50
*Day, Griswold & Co.,	-	-	210	Hunn, George A.	-	-	50
*Dixon, James	-	-	210	Hooker, B. E.	-	-	50
Dillibar, Miss Hannah	-	-	100	Humphrey, Lemuel	-	-	50
*Deming, Henry C.	-	-	100	Hubbard, Richard D.	-	-	50
Day, Calvin	-	-	210	Hillyer, C. T.	-	-	60
Davis, G. F.	-	-	110	Hopkins, William R.	-	-	50
*Danforth, J. W.	-	-	50	Howard, Chauncey	-	-	50
Day, Horatio E.	-	-	60	Hollander, A.	-	-	50
Dyer, George B.	-	-	25	*Hammond, A. G.	-	-	50
Day, Thomas M.	-	-	10	Hubbard, Samuel	-	-	50
Dimock, Joseph W.	-	-	10	Harbison, Hugh	-	-	50
Ely, William D.	-	-	100	*Hammersley, William James	-	-	35
Eldredge, John B.	-	-	50	*Hills, Isaac and Son	-	-	25
*Euson, A. D.	-	-	50	*Ives, Lawson C.	-	-	110
Ely & Co.,	-	-	25	*Jewell, P. & Son,	-	-	110
Eaton, William K.	-	-	10	Judd, J. F.	-	-	100
Fessenden, Edson	-	-	300	Jackson, J. C.	-	-	50
*Flower, Ebenezer	-	-	210	Johnson, Horace	-	-	50
*Freeman, Horace	-	-	110	*Joslyn, M.	-	-	50
French, Henry	-	-	110	*Judd, W. M.	-	-	10
*Foster & Co.,	-	-	100	Kellogg, E. N.	-	-	210

Keeney, H. & W. - - -	\$400	*Perkins, Henry - - -	\$50
Kingsbury, N. - - -	100	Phelps, D. B. - - -	50
Kohn, Tobias - - -	50	Pierson, L. T. - - -	25
Katzenburg & Wallach, -	50	*Pease, E. T. - - -	10
Kellogg, Joseph - - -	25	*Roberts, E. C. - - -	200
Kenyon, Robert - - -	25	*Rogers Brothers, - - -	320
Katzenberg, Mayer - - -	20	*Root, Elisha K. - - -	200
*Lee & Butler, - - -	520	*Ripley, E. G. - - -	210
Lincoln, George S. & Co. -	260	*Ripley, Philip - - -	100
Lyman, C. C. - - -	200	Robbins, P. F. - - -	110
*Loomis, Simeon L. - - -	200	*Robinson, L. F. - - -	100
*Lobdell, E. Thomas - - -	50	Russell, Dr. G. W. - - -	50
Langdon, Joseph - - -	60	*Rogers, Dr. Benjamin - - -	50
Lee & Dean, - - -	50	*Root, Thomas S. - - -	50
*Lincoln, Theo. M. - - -	50	Reed, E. M. - - -	50
Lord, Horace - - -	50	Roberts, Ebenezer - - -	50
Loth, Joseph - - -	50	Rothenburg, L. - - -	50
Litchfield, N. - - -	20	Reed, Rawson - - -	50
Mather, Roland - - -	210	Smith, Thomas - - -	750
*Mather, William - - -	200	Seymour, John W. - - -	210
*Morgan, Mrs. Joseph - - -	200	Seymour, Charles - - -	210
Merriman, J. & M. - - -	200	*Storrs, William L. - - -	275
Most, John H. - - -	100	*Shepard, Mrs. Eliza K. -	200
*Mather, Elijah - - -	100	*Sweet, Truman - - -	100
*Marsh, S. E. - - -	50	Sisson, A. L. - - -	150
Morgan, Henry K. - - -	50	Seymour, O. D. - - -	100
*McNamara, Hugh - - -	60	Smith, Elisha T. - - -	160
*Marston, Stephen - - -	50	*Smith, Erastus - - -	110
Mather, Charles - - -	50	*Smythe, Isaac F. - - -	100
Mandlebaum, Jacob - - -	50	*Sperry, Stiles D. - - -	100
*Mather, Samuel - - -	250	*Sargent, L. N. - - -	100
Morris, J. F. - - -	50	Starr, B. P. - - -	100
Mayer, David - - -	50	*Seymour, D. M. - - -	50
*Mowry, N. - - -	50	Smith, Chauncey G. - - -	50
McNary, J. M. B. - - -	50	Squires, William H. - - -	50
Moore, George W. - - -	50	Sears, H. K. - - -	50
*Matson, William N. - - -	25	Skinner, Thomas - - -	50
*Morgan, Denison - - -	10	Sisson, Thomas - - -	50
Morgan, N. H. - - -	10	*Spencer, Calvin - - -	60
McManus, J. T. - - -	10	*Savage, Samuel G. - - -	50
*Niles, John M. - - -	210	*Stillman, P. D. - - -	60
Northam, C. H. - - -	50	*Shultas, James B. - - -	50
Nott, Samuel - - -	10	*Seyms, George - - -	50
Owen, E. H. - - -	60	Seyms, R. S. - - -	60
*Olmsted, John - - -	10	Stebbins, Lucius - - -	50
*Pond, Charles F. - - -	300	Seymour, Harvey - - -	60
Pond, Charles M. - - -	200	Stern, Meyer - - -	50
*Perkins, Henry A. - - -	210	Selling, Henry - - -	50
*Parsons, Francis - - -	310	Selling, David - - -	50
*Peck, Ira - - -	400	Simons, H. - - -	50
Phillips, Daniel - - -	310	Stern, Abraham - - -	50
*Phelps, Guy R. - - -	200	Sanford, Charles W. - - -	50
Pratt, Miss Esther - - -	200	Spencer, William - - -	50
Powell, J. B. - - -	100	Sugden, William E. - - -	50
*Palmer, J. C. - - -	100	*Sexton, Lorin - - -	50
Pratt, Joseph - - -	150	*Spencer, Stephen - - -	25
Pratt, H. Z. - - -	100	*Sheldon, H. & Co. - - -	25
Parker, E. A. - - -	50	Smith, Joseph - - -	25
*Pierson, A. - - -	60	*Seymour, Jeremiah - - -	25
*Porter, H. L. - - -	60	*Steele, Thomas - - -	10

*Sigourney, C. H. - - -	\$10	*Wilcox, Loyal - - -	\$100
*Smith, Alfred - - -	10	*White, Sidney A. - - -	110
Sill, George G. - - -	10	*Wadsworth, Tertius - - -	100
*Sigourney, Mrs. L. H. - - -	10	West, A. G. - - -	100
*Trumbull, Joseph - - -	660	*White, Moses - - -	50
*Tuttle, Miles A. - - -	210	White, William S. - - -	50
Turner, William W. - - -	200	Wallach, H. & Co. - - -	50
*Toucey, Isaac - - -	200	Wallach, Ph. & Co. - - -	50
*Terry, O. G. - - -	200	*Ward, James - - -	50
Taylor, Edwin - - -	135	*Wright, William L. - - -	50
*Talcott, Russell G. - - -	110	*Wells, Charles P. - - -	50
*Terry, Seth - - -	100	Walkley, James C. - - -	60
*Thatcher, S. P. & Goodrich	120	Wesson, David - - -	50
*Tyler, Frederick - - -	100	Wells, James G. - - -	50
*Thompson, Hussey & Slater,	50	*Williams, Henry P. - - -	90
Thayer, E. A. - - -	50	Wells & Burnham, - - -	50
Taylor, Samuel - - -	50	Weatherby, C. S. - - -	50
*Tucker, Erastus - - -	50	Williams & Hall, - - -	50
Taylor, Henry - - -	50	*Westland, William D. - - -	50
Talcott, C. M. - - -	60	White, J. W. - - -	50
*Terry, Roderick - - -	10	Wood, William A. - - -	50
Vallant, Richard - - -	50	Woolley, G. W. & W. P. - - -	50
Woodruff & Beach, - - -	500	*Warburton, John - - -	1,000
*Ward, Samuel S. - - -	310	*Wells, Gideon - - -	10
Welch, George M. - - -	210	Wells, H. D. - - -	10
*Wells, James H. - - -	210		
*Waterman, N. M. - - -	200	Total, - - -	\$38,325

SUBSCRIPTIONS FOR BUILDING PURPOSES SINCE 1867.

Allyn, T. M. - - -	\$6,000	*Hall, George - - -	\$1,000
Bartholomew, George M. - - -	1,000	*Hills, Ellery - - -	500
*Beach, George - - -	1,000	Hollander, A. - - -	50
*Beach, John - - -	500	*Howe, E. G. - - -	1,000
Bolles & Sexton, - - -	250	Hillyer, Charles T. - - -	500
Boswell, Charles - - -	500	*Hungerford & Cone, - - -	250
Beach, C. N. - - -	500	Hunt, Holbrook & Barber,* - - -	1,000
*Brace, Jonathan - - -	200	Jarvis, R. W. H. - - -	500
Catlin, Julius - - -	200	Keney, H. & W. - - -	6,000
Cheney Brothers, - - -	500	Langdon, Joseph - - -	100
*Church, Joseph - - -	1,000	*Lee, William T. - - -	500
Clark, George H. - - -	500	Lord, Horace - - -	50
Coit, Samuel - - -	1,000	Lyman, C. C. - - -	1,000
*Collins, Erastus - - -	500	*Marston, Stephen - - -	100
*Colt, Samuel C. - - -	1,000	*Mather, Samuel - - -	1,000
Colt, Mrs. Samuel - - -	6,000	Niles, J. M. - - -	1,000
Cooley, Francis B. - - -	1,000	*Niles, J. S. - - -	500
Daniels, Leonard - - -	250	Northam, Charles H. - - -	1,000
Day, Calvin - - -	1,000	*Palmer, Nelson - - -	100
Day, Thomas M. - - -	500	*Perkins, H. A. - - -	2,000
*Foster & Co., - - -	500	Pardee, Dwight - - -	100
*Goodwin, John H. - - -	1,500	Phillips, Daniel - - -	500

Pond, Charles M.	\$500	Tuttle, William F.	\$1,000
Pratt, Joseph - - -	500	*Ward, Samuel S. -	300
Reed, E. M. - - -	200	*Waterman, N. M. -	500
Robinson, Mrs. Ann S. -	100	*Watkinson, Miss E. M. -	1,000
Robinson, Henry C. - -	400	*Watkinson, Robert -	1,000
Rood, D. A. - - -	100	*Welles, Oswin -	500
Smith, Thomas - - -	2,000	Woodruff & Beach, -	1,000
Taylor, E. M. & Co.	250	Welles, Miss Mary W. -	500
Turner, William W.	500		
Tuttle, Samuel J. - -	1,000	Total,	\$54,900



FOURTH

ANNUAL REPORT

— OF —

The Connecticut Prison Association.



HARTFORD, CONN.

1881.

REPORT OF THE EXECUTIVE COMMITTEE.

For a detailed account of what the Society has accomplished during the past year, we refer to the reports of the Secretary and Treasurer, herewith submitted. The general result cannot but be gratifying to all who are friendly to the objects of the Association.

While we have much reason to be satisfied with what has been done, we believe that with additional resources we can render still more important services to the prisoners and to the community. Impressed with this conviction, the Association at its last annual meeting, (January 4th, 1881,) instructed its President to ask at the hands of the General Assembly an increased appropriation to enable us to carry out more completely the purposes contemplated by our organization.

Since our last report the Association has suffered a serious loss in the death of Hon. Lafayette S. Foster, long one of its Vice-Presidents, and a member of its Executive Committee. Although the numerous engagements of Mr. Foster prevented his regular attendance at our quarterly meetings, he never failed to give us the benefit of his counsels and the support of his encouraging words.

Those who knew Judge Foster will not be surprised to learn that the condition of the discharged prisoner, homeless and friendless, but sincerely desiring to earn an honest livelihood, strongly appealed to his warm heart and his well informed philanthropy. His views of the duty which society and the State owe to this most unfortunate class, were clearly defined and always on the side of enlightened humanity. Too wise to waste his sympathy in sentimental regrets, he labored with his fellow officers of the Prison Association to devise the best means to help the prisoner by teaching him to help himself. As might have been expected from the character of the man, his suggestions, founded on long experience at the bar and on the bench, were thoroughly practical and conservative. What he had seen

of the causes of crime, the temptations by which weak or ignorant men are assailed, of the criminal instinct which is inherited and of the evil companionship which is demoralizing, had taught him that while violations of law must be punished for the protection of society, no pains should be spared to make such punishment tend towards the reformation of the offender. He deprecated undue severity in prison regulations and considered it of prime importance that all the influences surrounding the convict should be of such a nature as to ensure the best possible preparation for a reformed life. Believing that the moment of the prisoner's discharge is a crisis in his career and that judicious efforts made in his behalf at this time may in many cases reclaim him from the ranks of crime, he was among the first to approve the formation of this Association and became at once one of its most useful officers. His memory will be held in the highest esteem by those to whom he gave such cordial and intelligent support, and who ever found him an efficient ally in the cause of Prison Reform.

FRANCIS WAYLAND,

Chairman of Executive Committee.

TREASURER'S REPORT.

JOHN B. CORNING, TREASURER, *in account with* THE CONNECTICUT
PRISON ASSOCIATION.

RECEIPTS.

DR.	1880.	
From State Treasurer,		\$1,200.00
“ John C. Parsons, Treasurer Watkinson Fund,		300.00
“ Subscriptions and Donations,		715.22
		————— \$2,215.22

EXPENDITURES.

CR.	1880.	
Paid Approved Bills for Aid of Discharged Prisoners,		\$1,171.46
“ Deficit 1879,		152.00
“ on account of Agent's Salary,		838.26
“ for Printing Annual Report 1879,		45.50
		————— \$2,215.22

DEFICIT FOR YEAR 1880.

Bills Due December 31st, 1880,	181.94	
Total Expenses for year 1880.		\$2,397.16

DONATIONS, 1880.

♦ ♦ ♦

Henry Farnam, - - -	New Haven, - -	\$50.00
George Bunce, - - -	South Manchester, -	37.20
Frederick Marquand, - - -	Southport, - - -	30.00
Mrs. H. A. Perkins, - - -	Hartford, - - -	25.00
Cheney Brothers, - - -	" - - -	25.00
Miss Isaphene Hillhouse, - - -	New Haven, - - -	25.00
Charles Benedict, - - -	Waterbury, - - -	25.00
F. J. Kingsbury, - - -	" - - -	25.00
J. S. Elton, - - -	" - - -	25.00
William E. Downes, - - -	Birmingham, - -	25.00
Pearl St. Congregational S. S.,	Hartford, - - -	20.12
Mrs. James H. Latham, - - -	New Haven, - - -	20.00
Mrs. T. D. Wheeler, - - -	" " - - -	10.00
Mrs. A. S. H. Davies, - - -	" " - - -	10.00
Mrs. J. B. Robertson, - - -	" " - - -	10.00
E. E. Salisbury, - - -	" " - - -	10.00
William Franklin, - - -	" " - - -	10.00
Cash, - - -	" " - - -	10.00
Francis A. Walker, - - -	" " - - -	10.00
Mrs. William Fitch, - - -	" " - - -	10.00
Thomas Smith, - - -	Hartford, - - -	10.00
John B. Eldredge, - - -	" - - -	10.00
George P. Bissell, - - -	" - - -	10.00
James Hughes, - - -	" - - -	10.00
Mrs. Charles Nichols, - - -	New Britain, - - -	10.00
C. D. Kingsbury, - - -	Waterbury, - - -	10.00
Cash, J. I—, - - -	Philadelphia, - - -	10.00
Frederick Deming, - - -	Litchfield, - - -	10.00
I. C. Lewis, - - -	Meriden, - - -	10.00
Miss F. Wakeman, - - -	Southport, - - -	10.00
Mrs. M. F. Wait, - - -	Stamford, - - -	10.00
Benjamin Douglass, - - -	Middletown, - - -	10.00
Cash, J—, - - -	Seymour, - - -	8.50
Mrs. Charles Perry, - - -	Southport, - - -	7.00
Edward W. Wells, - - -	Hartford, - - -	5.00
Miss Mary W. Wells, - - -	" - - -	5.00
Mrs. E. H. Perkins, - - -	" - - -	5.00
Walter Keney, - - -	" - - -	5.00
E. K. Hunt, M. D., - - -	" - - -	5.00
Mrs. Ellery Hills, - - -	" - - -	5.00
Rodney Dennis, - - -	" - - -	5.00
Timothy M. Allyn, - - -	" - - -	5.00

William B. Franklin,	-	-	Hartford,	-	-	5.00
John D. Browne,	-	-	"	-	-	5.00
John G. Belden,	-	-	"	-	-	5.00
E. H. Bishop, M D.,	-	-	New Haven,	-	-	5.00
Mrs. Thomas G. Bennett,	-	-	"	"	-	5.00
Miss E. W. Davenport,	-	-	"	"	-	5.00
Noah Porter,	-	-	"	"	-	5.00
Mrs. C. C. Davies,	-	-	"	"	-	5.00
Mrs. J. W. Mansfield,	-	-	"	"	-	5.00
Mrs. J. P. Elton,	-	-	Waterbury,	-	-	5.00
Mrs. Israel Holmes,	-	-	"	-	-	5.00
A. S. Chase,	-	-	"	-	-	5.00
Miss Julia A. Alvord,	-	-	Southport,	-	-	5.00
Mrs. W. D. Gookin,	-	-	"	-	-	5.00
Robbins Battell,	-	-	Norfolk,	-	-	5.00
Mrs. Julia F. Noyes,	-	-	Litchfield,	-	-	5.00
Mrs. E. N. Vanderpool,	-	-	"	-	-	5.00
A. R. Crittenden,	-	-	Middletown,	-	-	5.00
E. Leavenworth,	-	-	Waterbury,	-	-	3.00
John Mullings,	-	-	"	-	-	3.00
Alfred North, M. D.,	-	-	"	-	-	3.00
Theodore D. Woolsey,	-	-	New Haven,	-	-	3.00
Joshua Coit,	-	-	"	"	-	3.00
Cash, Rebates,	-	-	Hartford,	-	-	2.90
William Thompson,	-	-	"	-	-	2.00
L. B. Haas,	-	-	"	-	-	2.00
Leonard Bacon,	-	-	New Haven,	-	-	2.00
L. I. Munson,	-	-	Waterbury,	-	-	2.00
C. S. Harrington,	-	-	Middletown,	-	-	2.00
Anonymous Letter,	-	-	Hartford,	-	-	2.00
J. C. Taylor,	-	-	"	-	-	1.00
Mrs. J. C. Taylor,	-	-	"	-	-	1.00
William A. Ayres,	-	-	"	-	-	1.00
J. M. Burrall,	-	-	Waterbury,	-	-	1.00
George M. Carrington,	-	-	West Winsted,	-	-	1.00
Miss L. I. Mead,	-	-	Stamford,	-	-	1.00
Mrs. Harriet Scovill,	-	-	Waterbury,	-	-	1.00
Cash,	-	-	New Haven,	-	-	.50

\$715.22

REPORT OF THE SECRETARY AND AGENT.

Gentlemen of the Executive Committee:

During the year ending December 31st, 1880, there have been 122 prisoners discharged from the Connecticut State Prison, as follows:

By reason of expiration of sentence,	103
“ “ transfer to Hospital for insane,	8
“ “ pardon by General Assembly, 1880,	6
“ “ death,	4
“ “ pardon by Secretary of U. S. Navy,	1—122

Of this number 120 were males and 2 were females, 122

The number who came under the care of the agent is

109. They were aided as follows:

Employment or boarded while seeking work, 74

Tickets to place of employment were furnished to the 74 above mentioned.

Sent home or to friends at their request, 28

Refused to work; no aid furnished, 1

Insane, returned to friends or legal guardians, 6—109

Clothing has been furnished to 46 of those who accepted employment.

Needed assistance has also been rendered to 6 persons who were discharged from the State Prison previous to 1880, and 4 prisoners from the County Jail have been furnished with tickets to their homes.

The six insane prisoners who, on their discharge from prison, were placed in my care, belonged to that most unfortunate class, “insane paupers.” They were not Connecticut paupers. By the probable willful negligence of their friends (?) or the authorities whose care and burden they were, they had been permitted to wander into this State, and, very unjustly, in my opinion, were committed to our State Prison under the provisions of the “tramp law.” Their insanity was chronic, and probably incurable. They either could not or would not give any intel-

ligible information about themselves, where they came from or where they belonged. With the careful and patient assistance rendered me by the Warden, Deputy Warden and Officer McManus, some slight clues were gathered, by aid of which I was enabled to take action that resulted in establishing the identity of each of these insane persons. One belonged in New Hampshire, and had for years been an inmate of one of their institutions. But a short time before his escape from there, he had killed a fellow inmate. He was placed by the agent in charge of the officials of the town and state above named. Another had been in one of the New York asylums, and certainly was far from cured. He was returned to New York by the agent, and placed in charge of the Commissioners of Charities. Another was returned to his brother's care in the central part of New York State.

It will readily be seen that were these men once committed to the State Hospital for the Insane, they would probably become permanent burdens for the State of Connecticut. They were incurables, and those whose legal duty it was to provide and care for them, were only too glad to be rid of their charges, and certainly would never take pains to find them. In each case these men were returned in my charge to the State from whence they came, and placed in custody of those whose legitimate wards they were. The saving to the State of Connecticut by this course, was equal to or greater than the sum appropriated for the use of this Association. If additional funds can be had, I would suggest that the agent be empowered to undertake—with the consent and co-operation of the sheriffs of the various counties of the State—the work of discovering the identity of and returning to their legal guardians such insane paupers as shall from time to time be committed to the jails, and who are not legal residents of any town in this State. This action would relieve the sheriffs of a class of prisoners for whose proper care no facilities are provided in the jails, and it would prevent the injustice of their being committed to the State Prison where there is no possible way of properly or humanely caring for them. This plan would seem to commend itself both on the grounds of humanity and economy. Of the 109 prisoners who were cared for by the agent, 7 have relapsed to crime and have been returned to prison. The whereabouts of thirty-two more are unknown to me, and although it does not follow that these have all gone back to crime, this is

presumably true of some if not the most of them. Some others whose residence *is known* to the agent, are not leading sober lives and will undoubtedly fall into still more evil ways if they persist in disregarding the advice of their real friends. But so large a proportion of the whole are doing well, are sober, industrious and faithful to their promises that I feel warranted in reporting this as the most satisfactory year's work yet accomplished. I meet each prisoner in the Warden's office at the State Prison on the morning of his discharge, and do whatever is possible with the means provided to induce and assist him to an honest start. Out of a large number of letters received from discharged prisoners during the year, I have made several extracts, which are appended as direct evidence of the appreciation by the writers of our advice and assistance.

Under date of January 18, 1880, a young man of 20 years of age writes :

"MR. TAYLOR :

DEAR SIR,—It has been quite a time since I have heard from you. I believe you owe me a letter, do you not? I am doing well; have got a good job, and some of the best friends in the world. I see you sent another man from *there* here to——. I have met him once. He did not recognize me; I shall keep out of his way. I have excellent friends in Mr. and Mrs. B. I could not have better. If you wish to know about me, just write to them.

This young man is still in the same place and well liked.

February 1st, 1880, one writes :

FRIEND TAYLOR :

I have at last got my family together, but have not been so I could go to work yet, as my wife has not been able to leave her bed. I have had a hard time with her, for she was out of her head some of the time, and I feel worn out; my way looked dark but I never gave up, for God gave me strength and courage. I expect to go to work to-morrow. I am very thankful for your kindness in sending me the check. I have made good use of the money and do not know what I could have done without it, under the circumstances.

May 2d, 1880 :

MR. TAYLOR :

DEAR SIR,—I will write a few lines to let you know that I am well and doing well, and if you have got a good colored man that can act as porter and also wait on table, please send him to me, I have a good place for him. Don't tell him nothing about me.

Another writes, February 6, 1880 :

DEAR SIR.—I arrived safely home on Saturday, and was received with happiness by my family. I am glad to inform you that I have succeeded in getting work. Please to accept my thanks for your kindness, and the timely assistance you gave me. In return I will strive to lead a good live, soberly.

February 16, 1880, a boy writes :

MR. TAYLOR :

I write you a few lines, hoping to hear from you. I am quite well, except a bad cold. I am at work ; I get one dollar a day and board myself out of it. I have let rum alone, and I intend to : I am doing quite well, and I thank you for all of your kindness to me. I have all the work I can do now. I would like to see you. I am coming to Hartford before long, and I will come to your room. I hope you will write as soon as you get this.

April 15, 1880, a young man who was sent to prison under the "tramp" law, writes :

DEAR SIR.—I now take the pleasure of writing to you to let you know that I arrived safe. I got a situation within a week that suits me. I am very thankful to you for the kind interest you took in me, and I hope the time will come when I can acknowledge it. I hope God will give me strength to fight against all temptation.

This man's besetting evil was drink, and so far he has done well, and lived soberly.

The following letter is from a father whose son had wandered away from home with evil companions :

J. C. TAYLOR, SECRETARY PRISON ASSOCIATION :

DEAR SIR,—Your kind letter of the 2d inst. is received. I am thankful that my wayward son has fallen into care of your excellent Association, although it is painful to learn that he has been in prison. I hope above all things, that he has changed his course of life and *really* means to make a good record. I am willing to do what is in my power to aid you in your worthy effort to care for him and secure him employment. He has a fair education, and intelligence sufficient to make him a good livelihood anywhere. However much I desire to see him take his position again in the family, cannot convince him that it would be prudent for his welfare as he would have to run the gauntlet of his old companions, that I feel certain would counteract any good intentions he may have. Enclosed please find ten dollars, as an earnest that I mean to stand by you in your work, and will forward more if necessary, when I hear further. Again I thank you.

It is sad to relate that the young man turned out very badly. He was placed by the Agent in a most excellent family. He swindled them and disappeared.

NEW YORK, *July 2d*, 1880.

DEAR SIR:

I now take the pleasure of writing you these few lines to let you know that I am going away, and I want to thank you for your kindness to me. I am going to Australia. I have got a very good place since I have been here. I have been well treated. Mr. Dunn is a very good and kind-hearted man. Good bye, and may God speed you.

The writer of the above was brought up by drunken parents, and was of course a wild and reckless boy. He had been in the Reform School, the Jail, and the State Prison, and as discipline was a necessity to keep him anywhere near right, the agent sent him to sea, to be gone about three years.

SAVANNAH, *July 30th*, 1880.

MR. TAYLOR:

DEAR FRIEND,—If this letter is unexpected, I hope it will be welcome. I also hope that you have not thought me ungrateful for your kindness to me. I meant to write to you before, but I had no chance. I shipped on a full rigged bark bound for a place called —, 900 miles south of New York. My wages are \$18 per month. We are now in Savannah. I wish you may live long and prosper. Good bye.

August 9, 1880.

DEAR SIR,—I now take this opportunity to write you a few lines, to let you know that I meant what I said when I told you that I should try to do better, and be a man. I am well, and doing well at this time. I have been out of prison about two years. Now I am getting \$2.50 per day. I have put \$40.00 in the bank. Now I would like to know if I can be made a citizen.

As this young man was not 21 years of age when discharged from prison, and had therefore never been made a citizen, the agent thought he could not loose what he had never had, viz.: citizenship; and being confirmed in this opinion by a lawyer, the young man was so advised. He is still doing as well as anybody could, and surely merits the elective franchise if he wants it, quite as much as, if not more than many who have never been in prison.

Another man committed to State Prison as a “tramp,” and who was furnished clothing and transportation to where his wife was living, writes as follows:

DEAR SIR,—I arrived here safe and found my friends, and they were very glad to see me looking so well. I had a job of work waiting for me which I was very thankful to get. I am now at work for Mr. —, and get \$1.25 per day.

November 5, 1880.

MR. TAYLOR:

I arrived here all safe. I am at work about nine miles from B——. There is plenty of work here. I return my sincere thanks to the Prison Association for all they have done for me.

The writer of the above is a skilled workman. He was furnished by me with clothing, ticket to the place where he got work, and directions where this work could be found, and the name and address of the employer. A small sum of money was given him for his immediate needs. The result is, he has plenty of work and the fact of his being an ex-convict is not known to anyone in his vicinity. This plan on the whole results better than to introduce a man to employers as an ex-convict. In one instance I failed to procure work for a man on my application for him, and the real reason was because he was a discharged prisoner. On his own application at the same place, (he being a stranger, not having been seen by them when I applied for work for him, and by my direction withholding the fact of having been in prison,) he was employed, and when I last saw him, a few weeks ago, he was still at work there giving good satisfaction, having been there nearly two years. The natural and to a certain extent, fair prejudice which exists in the minds of most people against men of this class, makes it much more difficult for them to obtain employment than the facts really warrant. It certainly is safer to employ them than to refuse to do so, for if every door to an honest living is closed against them, it matters not how good intentions they may have, they are forced to crime of necessity. No prisoner discharged from the State Prison during the past year, can truthfully say that he was *obliged* to commit crime, since his release. That some *have* relapsed was to be expected. We can enter upon the work of the New Year with a great deal of encouragement from the results attained during the year that has just ended.

Very Respectfully,

JOHN C. TAYLOR,

Secretary and Agent.

*Extract from the Message of His Excellency, Gov. Bigelow, January
5th, 1881.*

“I cannot omit favorable mention of the Connecticut Prison Association, which administers a State charity and performs an important work successfully and economically. Their report will show what results have rewarded their efforts. They merit and should receive from the State such aid as their moderate necessities require.”

